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1997

EPA Superfund
Record of Decision:

HANFORD 200-AREA (USDOE)
EPA ID: WA1890090078
OU 12
BENTON COUNTY, WA
02/11/1997

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DECLARATION OF THE RECORD OF DECISION

SITE NAME AND LOCATION

U.S. DOE Hanford 200 Area
Hanford Site
Benton County, Washington

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected Interim Remedial Action (IRA) for the U.S. Department of Energy (U.S. DOE) Hanford 200-UP-1 Operable Unit (OU), 200 Area, Hanford Site, Benton County, Washington. The IRA was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Hanford Federal Facility Agreement and Consent Order (also known as the Tri-Party Agreement, or TPA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

The State of Washington concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this interim action Record of Decision (ROD), may present an imminent and substantial endangerment to the public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy consists of pumping the highest concentration zone of the contaminated groundwater plume at 200-UP-1 and treatment using the existing Effluent Treatment Facility (ETF) located in the 200 East Area. The selected remedy is intended to reduce contaminant mass within the plume and minimize migration of uranium and technetium-99 from the 200 West Area. The selected remedy will remove and treat these two contaminants of concern, in addition to the specific co-contaminants of nitrate and carbon tetrachloride which exist within the groundwater. The high concentration portion of the plume corresponds to that area having contaminant greater than or equal to levels ten times the cleanup level of uranium under the Model Toxics Control Act (MTCA), and ten times greater than the maximum contamination limit (MCL) for technetium-99 (see Figures 4 and 5). The cleanup level is based solely on an assessment of uranium toxicity, and not on cancer risk that it may pose.

During this IRA the ETF, which is located in the 200 East Area, will be used for the treatment and removal of contaminants of the groundwater. The ETF is a multistage facility that can remove and/or destroy a large number of contaminants, including nitrate and carbon tetrachloride, which are present at high concentrations in the 200-UP-1 OU groundwater. The State of Washington has made a contained in determination of carbon tetrachloride for this action in order to facilitate the treatment of carbon tetrachloride at the ETF.

BACKGROUND

A pilot scale system was started in April 1994 at a rate of about 60 liters per minute (15 gallons per minute [gpm]) to remove uranium and technetium-99. The pilot scale system proved to be successful in the removal of contaminants from the groundwater. The system was upgraded to 190 liters per minute (50 gpm) in September 1995 by construction of additional extraction and injection wells. Based on the results of the actual field data analysis of plume containment and mass removal, and the initial modeling results, a pumping rate of 190 liters per minute (50 gpm) is considered to be adequate to meet the IRA objectives. The goal of the IRA is to reduce the uranium and technetium-99 to at least ten times the cleanup level. Since there is no established value of maximum concentration limit (MCL) for uranium, the MTCA cleanup value is used for uranium in the IRA. Periodic monitoring and data collection activities will occur throughout the IRA.

STATUTORY DETERMINATIONS

This interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed. The groundwater removed will be treated to meet requirements before discharge. However, the underlying groundwater will not be treated to achieve SDWA and MTCA cleanup levels. This interim action is only part of the total remedial action and is cost effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the 200-UP-1 OU, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed further in the final response action. Subsequent actions are planned to fully address the threats posed by this operable unit.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after the commencement of the remedial action.

Because this is an interim action ROD, review of this OU will be ongoing as the three parties continue to develop and evaluate final remedial alternatives for the 200-UP-1 OU.

Signature sheet for the ROD for the U.S. DOE Hanford 200-UP-1 OU, 200 Area National Priorities List Site Interim Remedial Measure between the U.S. DOE and the Washington State Department of-Ecology, and the U.S. Environmental Protection Agency.

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Signature sheet for the ROD for the U.S. DOE Hanford 200-UP-1 OU, 200 Area National Priorities List Site Interim Remedial Measure between the U.S. DOE and the Washington State Department of Ecology, and the U.S. Environmental Protection Agency.

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Signature sheet for the ROD for the U.S. DOE Hanford 200-UP-1 OU, 200 Area National Priorities List Site Interim Remedial Measure between the U.S. DOE and the Washington State Department of Ecology, and the U.S. Environmental Protection Agency.

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DECISION SUMMARY

1.0 INTRODUCTION

The U.S. Department of Energy's (U.S. DOE's) Hanford Site was listed on the National Priorities List (NPL) in November 1989 under authorities granted by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The Hanford Site was divided and listed as four NPL sites: the 1100 Area, the 200 Area, the 300 Area, and the 100 Area.

This action is being taken as an interim action and is expected to become part of a final remedy selection for the 200-UP-1 Operable Unit (OU), which is part of the 200 Area NPL site.

2.0 SITE NAME, LOCATION, AND DESCRIPTION

The Hanford Site is a 1,450 square km (560 square mi) Federal facility located along the Columbia River in southeastern Washington, situated north and west of the cities of Richland, Kennewick, and Pasco, an area commonly known as the Tri-Cities (Figure 1). The 200 Area NPL site is located in the central portion of the Hanford Site, and covers less than 39 square km (15 square mi). The 200-UP-1 OU is located in the 200 West Area of the 200 Area NPL site. Contamination of the groundwater in the 200-UP-1 OU resulted from historic discharges primarily from the uranium processing plant.

The land surrounding the Hanford Site is used primarily for agriculture and livestock grazing. The major population center near the Hanford Site is the Tri-Cities, with a combined population of approximately 100,000.

The land is semi-arid with a sparse covering of cold desert shrubs and drought resistant grasses. Forty percent of the area's average annual rainfall of 15.9 cm (6.25 in.) occurs between November and January. In part due to the semi-arid conditions, no wetlands are contained within the boundary of 200-UP-1 OU.

The Columbia River is located approximately 16.1 km (10 mi) east and 7.5 km (4.7 mi) north of the 200 West Area. The 200 West Area is not within the 100-year flood plain of the Columbia River.

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3.0 SITE HISTORY AND ENFORCEMENT ACTIONS

The Hanford Site was established during World War II as part of the Army's "Manhattan Project" to produce plutonium for nuclear weapons. Hanford Site operations began in 1943, and U.S. DOE facilities are located throughout the Site and in the City of Richland. Much of the land that the Hanford Site now occupies was originally ceded to the government by treaty with various Native American tribes. Certain portions of the Hanford Site are known to have cultural significance and may be eligible for listing in the National Register of Historical Places.

In 1988, the Hanford Site was scored using the U.S. Environmental Protection Agency's (EPA's) Hazard Ranking System. As a result of the scoring, the Hanford Site was added to the NPL in November 1989 as four sites (the 1100 Area, the 200 Area, the 300 Area, and the 100 Area). Each of these areas was further divided into OUs (a grouping of individual waste units based primarily on geographic area and common waste sources).

U.S. DOE, EPA, and the Washington State Department of Ecology (Ecology) entered into a Federal Facility Agreement and Consent Order in May 1989. This agreement established a procedural framework and schedule for developing, implementing, and monitoring remedial response actions at the Hanford Site. The agreement also addresses Resource Conservation and Recovery Act (RCRA) compliance and permitting.

The 200-UP-1 OU is one of two groundwater OUs located in the 200 West Area and is shown in Figure 2. Contamination in the 200-UP-1 OU resulted from historic discharges to five primary liquid waste disposal sites. These five sites are at cribs 216-U-1, 216-U-2, 216-U-8, 216-U-12, and 216-U-16. The predominant contaminants in the waste stream were uranium and technetium-99. It is estimated that 4,000 kg (8,800 lb) of process waste from Uranium Oxide (UO3) Plant, consisting primarily of dilute nitric acid containing uranium, technetium-99, and small quantities of other fission products, was discharged to the soil columns via two cribs (216-U-1 and 216-U-2) between 1951 and 1968. Most of these contaminants were initially retained in the upper 20 m (65 ft) of soil. During the final years of crib operation (1966 through 1968), highly acidic wastes were disposed, which resulted in mobilizing the contaminants. The mobile uranium was transported to groundwater when large volumes of cooling water were discharged to the adjacent 216-U-16 Crib in 1984. A pump and treat action was initiated in 1985 that removed 680 kg (1,500 lb) of uranium, reduced contaminant levels resulting in the concentrations present today (DOE-RL 1993).

During 1993, the U.S. DOE completed aggregate area management studies (AAMS) that compiled and evaluated information about source and groundwater contamination in the 200 West Area. Recommendations generated from the AAMS included interim actions to accelerate removal and limit the potential spread of contamination where information is sufficient to successfully plan and implement the actions. For the 200-UP-1 OU, the area containing the highest concentration of uranium, technetium-99 and nitrate was recommended for an Interim Remedial Action (IRA). Subsequently, it was determined that nitrate should be removed from consideration as a contaminant of concern for this remedial action because the nitrate plume emanating from the 200 West Area is so extensive. Treatment of the portion of the nitrate plume within 200-UP-1 will not result in a significant reduction in the overall nitrate plume.

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4.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The U.S. DOE, Ecology, and EPA (the Tri-Parties) developed a Community Relations Plan (CRP) in April 1990 as part of the overall Hanford Site restoration. The CRP was designed to promote public awareness of the investigations, and promote public involvement in the decision-making process. Since April 1990, the Tri-Parties have held several public meetings and sent out numerous fact sheets in an effort to keep the public informed about Hanford Site cleanup issues. The CRP was updated in 1993 and 1996 to enhance public involvement.

The 200 West Groundwater Aggregate Area Management Study Report, the Interim Remedial Measure Proposed Plan for the 200-UP-1 OU, Hanford, Washington, and the Engineering Evaluation/Conceptual Plan for the 200-UP-1 OU Interim Remedial Measure (BHI-00187, Rev. 0) were made available on August 8, 1995, to the public in both the Administrative Record and the Information Repositories maintained at the locations listed below:

ADMINISTRATIVE RECORD (contains all project documents)

U.S. Department of Energy
Richland Operations Office
Administrative Record Center
740 Stevens Center
Richland, Washington 99352

EPA Region 10
Superfund Record Center
1200 Sixth Avenue
Park Place Building, 7th Floor
Seattle, Washington 98101

Washington State Department of Ecology
Administrative Record
300 Desmond Drive
Lacey, Washington 98503-1138

INFORMATION REPOSITORIES (contains limited documentation)

University of Washington
Suzzallo Library
Government Publications Room
Mail Stop FM-25
Seattle, Washington 98195

Gonzaga University
Foley Center
E. 502 Boone
Spokane, Washington 99258

Portland State University
Branford Price Millar Library
Science and Engineering Floor
SW Harrison and Park
P.O. Box 1151
Portland, Oregon 97207

U.S. DOE Richland Public Reading Room
Washington State University, Tri-Cities
100 Sprout Road, Room 130
Richland, Washington 99352

A fact sheet, which explained the proposed action, was mailed to approximately 2,000 people. In addition, an article appeared in the bi-monthly newsletter, the Hanford Update, detailing the start of public comment. The Hanford Update is mailed to over 5,000 people. The Proposed Plan went for public comment for 60 days from August 8 to October 6, 1995. Public notices were also published in the leading regional newspapers, such as Tri-City Herald, the Seattle Times P/I, the Spokesman Review, the Oregonian, and the Hood River News on August 8, 1995. Ecology made a presentation at the Hanford Advisory Board's Environmental Restoration Committee (HAB-ER) on September 8, 1995. A public meeting was also held at Kennewick on September 26, 1995. The public supported use of the pump and treat technology as a remedial alternative. However, the majority of the comments recommended consideration of the existing Effluent Treatment Facility (ETF) for the treatment of 200-UP-1 OU groundwater, as it was not considered in the original proposal. The public recommended use of the existing state of art treatment system of the ETF, located in the 200 East Area. Along with uranium and technetium-99, the ETF is capable of removing a wide variety of contaminants. A summary of the public response is provided in the Appendix A of this document.

Subsequently, U.S. DOE considered the use of ETF and the details were provided in the Engineering Evaluation/Conceptual Plan for the 200-UP-1 Operable Unit Interim Remedial Measure (BHI-00187, Rev. 2) with an accompanying transmittal letter (030528 of April 24, 1996). A focus sheet was published and distributed for public comment for a period of 60 days (from August 5, 1996, to October 4, 1996) explaining the use and benefit related to the proposed change. Public notices were also published in the leading regional newspapers of the State, such as Tri-City Herald, the Seattle Times P/I, the Spokesman Review, the Oregonian, and the Hood River News on August 5, 1996. The new proposal for the use of ETF was presented to the HAB-ER-subcommittee for their recommendation. The HAB endorsed use of ETF. This decision document presents the selected interim remedial measure for the 200 UP-1 OU at the Hanford Site, Richland, Washington, chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, the NCP.

5.0 SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY

This action is being taken in an effort to address one of the most serious groundwater problems on the Hanford Site. It is believed that, by reducing the uranium and technetium-99 within the high concentration portion of the plume, the potential for spread of contaminants to offsite receptors above a risk threshold can be reduced or eliminated. This action will facilitate further investigation of the 200-UP-1 OU by providing information about aquifer parameters based on data from the groundwater extraction and monitoring wells. In addition, this interim action will provide site specific performance information that can be used to evaluate alternative technologies, determine optimum process sizing, and estimate costs. This interim remedial action is expected to be consistent with any planned future actions. Because this interim action is not the final remedy for the 200-UP-1 OU, subsequent remedial actions will address any future potential threats posed by this site. This IRA and any subsequent remedial actions are based on Administrative Record (AR).

6.0 SITE CHARACTERISTICS

6.1 Site Geology and Hydrology

6.1.1 Geology

The Hanford Site is located in the Pasco Basin, which is a topographic and structural basin situated in the northern portion of the Columbia Plateau. The plateau is divided into three general structural subprovinces: the Blue Mountains; the Palouse; and the Yakima Fold Belt. The Hanford Site is located near the junction of the Yakima Fold Belt and the Palouse subprovinces as shown in Figure 3. The 200 Area is located in the center of the Hanford Site. The geologic structure beneath the 200 Area is similar to much of the rest of the Hanford Site, which consists of three distinct levels of soil formations. The deepest level is a thick series of basalt flows that have been folded, resulting in protrusions that crop out as rock ridges in some places. Layers of silt, gravel, and sand (known as the Ringold Formation) form the middle level. The uppermost level is known as the Hanford formation and consists of gravel and sands deposited by catastrophic floods during glacial retreat. A geologic cross section for the 200 West Area is shown in Figure 4. Both confined and unconfined aquifers can be found beneath the Hanford Site

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6.1.2 Hydrology

In the 200 West Area, the uppermost aquifer is located in the Ringold Formation and displays unconfined to locally confined or semi-confined conditions. The Ringold Formation is made up of a series of alluvial sands and gravels. The depth to groundwater ranges from approximately 58 to 82 in (190 to 269 ft) in the 200 West Area and in general flows from west to east. Groundwater recharge to the aquifer below the 200 Area has been primarily from process effluents. In the area near U Plant Area the depth to groundwater is from 60 to 66 m (197 to 216 ft). The saturated thickness of the unconfined aquifer around the U Plant is approximately 67 m (220 ft). The hydraulic conductivity fqr the Ringold Formation varies widely. The hydraulic conductivity for the Ringold Formation in the 200-UP-1 OU is approximately 50 ft per day. Groundwater flow direction is thought to be from the southwest.

6.2 Nature and Extent of Contamination

The 200 West Area is an operational area of approximately 5.1 square km (1.97 square mi) where spent nuclear fuel was processed in four main facilities: U Plant (primarily uranium recovery); Z Plant (primarily plutonium separation and recovery); and S and T Plants (primarily uranium and plutonium separation from irradiated fuel rods).

Monitoring programs have been in place for many years at the Hanford Site. Information from these monitoring programs was used to determine that an interim remedial action was needed at the 200-UP-1 OU.

Contamination in the 200-UP-1 OU resulted from historic discharges of process water from the UO3 Plant to five primary liquid waste disposal sites (cribs). The predominant contaminants were uranium and technetium-99. The major portion of discharge to the soil column was via two cribs (216-U-1 and 216-U-2) between 1951 and 1968, which transported the mobile constituents, particularly technetium-99, to the water table. However, most of the uranium discharged to the cribs was retained in the upper 20 m (66 ft) of the soil column. During the final years of the crib operation (1966 through 1968), small volumes of highly acidic decontamination wastes were discharged, which resulted in the dissolution of part of the previously deposited autunite (uranium carbonate) and transport of a small fraction of uranium phosphate. Low concentrations of uranium were seen in the groundwater monitoring wells near the 216-U-1 and 216-U-2 cribs during this period. The majority of dissolved uranium was distributed throughout the soil column beneath the crib with the largest concentration deposited above a caliche layer at about a 50 m (164 ft) depth. During 1984, large volumes of cooling water were discharged to the adjacent 216-U-16 crib which resulted in transport of uranium to the groundwater. During 1985 uranium concentrations in the groundwater abruptly increased from 166 to 72,000 pCi/L. Limited pump and treat activities were initiated in 1985 to recover the uranium from the groundwater using ion exchange. During the six months of pump and treat about 687 kg (1,500 lb) of uranium were recovered and the concentration in well 199-W19-3 was reduced to 1,700 pCi/L.

In addition to the uranium and technetium-99 plumes, nitrate and carbon tetrachloride are also present within 200-UP-1 OU in concentrations above the maximum concentration limit (MCL) for drinking water under the Safe Drinking Water Act. Nitrate contamination resulted from discharges of neutralized nitric acid to various cribs located in the U Plant and S Plant areas. The source for the carbon tetrachloride is believed to be upgradient and outside the 200-UP-1 OU, and associated with the Z Plant disposal sites. The extent of carbon tetrachloride and nitrate contaminant plumes are much larger compared to uranium and technetium-99 plumes. Carbon tetrachloride contamination in the groundwater is found throughout the entire 200 West Area. The nitrate plume extends from west of the 200 Area to the Columbia River. A small portion of carbon tetrachloride was used as a degreasing agent in the 200 Area. Therefore, the carbon tetrachloride plume was reported and designated as a listed waste. The nitrate plume is much larger and coalesces with other nitrate contaminant plumes from a number of 200 West Area facilities. Table 1 shows the list of contaminants encountered in the 200-UP-1 OU.

The present plume distributions for uranium, technetium-99, nitrate and carbon tetrachloride are illustrated in Figures 4, 5, 6, and 7. The leading edge of contamination for all these plumes has migrated beyond the 200 West Area boundary. The combined uranium and technetium-99 plume covers an area of 0.5 square km (0.2 square mi).

7.0 SUMMARY OF SITE RISKS

This section presents an overview of the risk assessment methodology and the qualitative risk evaluations undertaken as part of the assessment of the contaminated groundwater plumes in the 200-UP-1 OU.

During the assessment and information gathering phase, U.S. DOE performed an initial risk based screening, as well as a comparison of known contaminant concentrations in 200-UP-1 OU groundwater against pertinent federal and state groundwater standards. The risk-based screening was qualitative in nature and was designed to prioritize contaminant plumes for potential remedial actions. The screening concluded that uranium, technetium-99, and nitrate present a high potential risk due to their carcinogenic and or non-carcinogenic characteristics, and that these contaminants had been consistently detected in the groundwater at concentrations that significantly exceeded MCLs and other human health risk-based levels for drinking water. It should be noted that the contaminated 200-UP-1 OU groundwater is not currently used as a drinking water source, nor is it considered to be used for drinking water for the foreseeable future.

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Table 1. Maximum Concentration of Contaminants in the 200-UP-1 Operable Unit (1994-1995).

Constitute	Units	Maximum Concentration
1,1-Dichlolroethene	ug/L	3.2
1,2-Dichlolroethene	ug/L	5.5
4,4-DDD	ug/L	0.008
Arsenic	ug/L	17.1
Cadmium	ug/L	54
Carbon tetrachloride	ug/L	1800
Chloroform	ug/L	29
Chromium	ug/L	2400
Fluoride	ug/L	2400
Iodine-129	pCi/L	86.1
Plutonium-238	pCi/L	0.00415
Potassium-40	pCi/L	142
Selenium	ug/L	8.6
Strontium-90	pCi/L	71.3
Technetium-99	pCi/L	21400
Trichloroethene	ug/L	33
Uranium	ug/L	16400

Ref: DOE/RL-96-33 Draft A, July 1996

The evaluation of 200-UP-1 OU concluded uranium and technetium-99 present a relatively high potential risk for their carcinogenic characteristics. The radioisotopes of uranium and technetium-99 are known human carcinogens. The uranium in chemical forms and nitrate present potential risk for their non-carcinogenic health effects. Nitrate is a contaminant with a potential for causing methemoglobinemia, which may be life threatening to fetuses and infants.

The maximum concentrations were approximately 2,000 ppb for uranium and 23,700 pCi/L for technetium-99. The Drinking Water Standards maximum contaminant levels (MCL) for technetium-99 is 900 pCi/L. The Washington State Model Toxics Control Act (MTCA) cleanup standard for uranium is 48 ppb.

7.1 Qualitative Risk Assessment Methodology

A qualitative risk analysis of the 200-UP-1 groundwater operable unit was prepared based on the document titled, Risk-Based Decision Analysis for Groundwater Operable Units (BHI-00161). That analysis included the following evaluations:

- Characterization of potential risks to onsite workers via ingestion of contaminated drinking water under an industrial exposure scenario. The point of ingestion would be at the boundary of the 200 Area plateau.

- Estimation of downgradient concentrations at various potential receptor points while accounting for natural attenuation and dispersion of contaminants, assuming no remediation of the groundwater from 200-UP-1 OU.

7.2 Risk Characterization

For carcinogens, risks are estimated as the likelihood of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. These are expressed an exponential ratio such as 1 x 10E-4 (one additional cancer for 10,000 members of an exposed population). When potential risks exceed 1 x 10E-4, remedial action is generally required to reduce or eliminate the risk. For non-carcinogens, potential human health hazards are evaluated separately from carcinogens. The daily intake over a specified period of time is compared to a reference dose to determine the hazard quotient. A hazard quotient greater than 1.0 may require evaluation of the need for remedial action.

Incremental cancer risks and noncancer hazard quotients were estimated from limited groundwater sampling events undertaken between March 1993 and October 1994. The cancer and non-cancer risks were calculated assuming an industrial groundwater ingestion scenario. The results of those analyses indicated that under an industrial exposure scenario, uranium and technetium-99 present a 2.6 x 10E-4 risk for the high concentration area of the plume. For nitrate, the hazard quotient at the high concentration area of the plume was estimated to be 10.

8.0 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are site-specific goals that define the extent of cleanup necessary to achieve the specified level of remediation at the site. The RAOs are derived from applicable or relevant and appropriate requirements (ARARs), points of compliance, and the restoration timeframe for the remedial action. The RAOs were formulated to meet the overall goal of CERCLA, which is to provide protection of human health and the environment. The RAOs have been identified for the contaminated groundwater in the 200-UP-1 OU for this interim remedial action. The interim remedial action selected by this document has the following specific RAOs.

- Reducing contamination in the area of highest concentrations of uranium and technetium-99 to below 10 times the cleanup level under the MTCA, and 10 times the MCL for technetium-99.

- Reducing potential adverse human health risks through reduction of contaminant mass.

- Preventing further movement of these contaminants from the highest concentration area.

- Providing information that will lead to development and implementation of a final remedy that will be protective of human health and the environment.

Preliminary studies have indicated that about 2.5 to 3.0 years are required for the extraction of one pore volume of ground water from the capture zone at a pumping rate of 190 liters/min (50 gpm) from the existing well configuration. Based on the results of the ongoing pump and treat system, as well as modeling predictions, it is expected that removal and treatment of one pore volume of groundwater from the plume will meet the IRA objectives as defined above. Additional information will be obtained during the interim remedial action prior to the development and implementation of the final action. Effectiveness of the IRA will be evaluated based on site specific data. This evaluation should include: treatment cost, efficiency, evaluation of other technologies, hydraulic impacts, and effectiveness of the contaminant removal from the aquifer, and other related aspects. The IRA will continue to operate until such time U.S. DOE demonstrates to EPA and Ecology that no further interim action is required to protect human health and the environment. The goal of the IRA is to reduce the uranium and technetium-99 at or below ten times the cleanup level and to reduce contaminant mass such that potential downgradient risks are reduced.

Major applicable or relevant and appropriate requirements (ARARs) include drinking water standards, state effluent discharge standards, solid and hazardous waste designation and management standards, and air emission standards (e.g., for venting releases from tanks or piping). This action is an interim action designed to reduce risk through contaminant mass reduction. This action is an interim measure which will become part of a final remedial action that will attain all applicable or relevant and appropriate requirements as provided for in Section 121 of CERCLA.

9.0 DESCRIPTION OF ALTERNATIVES

The Engineering Evaluation/Conceptual Plan for the 200-UP-1 Groundwater Operable Unit Interim Remedial Measure identified two general response actions for the contaminated groundwater. A third alternative was identified during public comment in the fall of 1995. The three alternatives evaluated for the interim remedial action include:

- No Action
- Groundwater Pump and Treat Using the Existing Onsite Treatment System
- Groundwater Pump and Treat Using the Effluent Treatment Facility.

9.1 Alternative 1: No Action

Evaluation of this alternative is required under CERCLA serves as a reference against which other alternatives can be compared. Under this alternative, no action would be taken to remove, treat, or restrict the further migration of contaminated groundwater. Although the U.S. DOE would retain control of the site throughout the interim period, no additional institutional controls would be implemented, for the no action alternative. Additional monitoring and restrictions would not be implemented, contaminants would continue to migrate and dissipate resulting in the expansion of the contaminant plume. This alternative invokes no additional costs.

9.2 Alternative 2: Groundwater Pump and Treat Using Onsite Treatment System

This alternative would consist of extracting groundwater; treating it to remove uranium, technetium-99 and carbon tetrachloride; and then returning the treated water to the same aquifer up-gradient of the pumping location. Carbon tetrachloride is a co-contaminant and a listed waste. The source of carbon tetrachloride is believed to be from the disposal sites associated with Z Plant, upgradient and outside the 200-UP-1 OU. Under this alternative, the pump and treat system is the continuation of the treatability study, which began on April 1994, as a pilot-scale treatment system. The pilot-scale system was upgraded from 57 liters/min (15 gal/min.) to 190 liters/min (50 gals/min.) flow rate in September 1995. Re-analysis of the capture system by the U.S. DOE, using aquifer parameters derived from the site-specific aquifer tests and an up-to-date configuration of the water table, indicates that 190 liters/min (50 gals/min.) will contain and capture uranium plume greater than 480 ppb and technetium-99 plume greater than 9,000 pCi/L. The existing treatment system uses an ion exchange and granulated activated carbon (GAC) treatment. Ion exchange is used to remove uranium and technetium-99 and GAC is used as a polishing step to remove carbon tetrachloride. During the IRA period, plume monitoring would continue and may include installation of additional monitoring and backup production wells.

Table 2. Pump and Treat Cost Using 200-UP-1 Operable Unit Onsite System.

($ x 1000)	FY 1996 a	FY 1997 b	FY 1998 b
Operations and Maintenance c	586	586	586
Consumables d	145	145	145
Waste Disposal e	3	3	3
Process Monitoring/Sampling f	326	326	326
Utilities	50	50	50
Performance Monitoring g	279	279	279
System Upgrades h	836.2	163.8	--
Well Installation i	277	--	--
Data Management/Reporting j	57	57	57
Escalation (2.3%/yr)	--	33	67
Total Cost to Treat	2559.2	1642.8	1.513

a Fiscal year (FY) 1996 activities include 12 months of operating existing system at 50 gal/min; design, procurement and installation of system upgrades; installation/tie-in of one extraction well.
b FY 1997 and 1998 activities include 12 months of operations at 50 gal/min.
c Operations and maintenance costs are based on actual FY 1996 cost accounts and include process operations labor, engineering support, field support, radiological control, site safety, quality assurance oversight, and associated overheads (G&A).
d Consumables include ion-exchange resin, granular activated carbon (GAQ, process filters and miscellaneous materials for maintenance.
e Waste disposal costs include materials (drums, labels, etc.), waste designation and disposal. Disposal costs assume 1,065 ft 3/yr of ion-exchange resin disposed of at the ERDF @ $55/yd 3 and 75 ft 3/yr of GAC @ $55/yd 3.
f Process monitoring/sampling includes two influent and two effluent samples per 500,000 gal of groundwater treated (analyzed onsite), 2 monthly treatment system efficiency/confirmatory samples analyzed by an independent laboratory (offsite), five samples per month for waste designation (analyzed offsite) and supporting quality assurance/quality control samples. Process monitoring costs also include sample disposal costs.
g Performance monitoring includes monthly sampling of approximately 12 monitoring wells to assess interim remedial measure (IRM) performance.
h Upgrades include design, procurement of a resin/GAC slurry changeout system. Assumes double-contained pipeline with leak detection is required.
i Well installation costs include design, procurement, installation, tie-in, and surveying costs for one extraction well.
j Data interpretation/reporting includes preparation of quarterly IRM performance reports summarizing process and groundwater data.

The provision of Washington Administrative Code (WAC) 173-303, Dangerous Waste Regulations, would be applicable to the management and treatment of the groundwater at 200-UP-1 OU because of the carbon tetrachloride in the groundwater is designated a listed waste. The present treatment system does not meet the dangerous waste standard for secondary containment for tank and piping systems (WAC 173-303-640). Implementation of the ROD using the current on site system would require the addition of secondary containment or an ARAR waiver of this provision.

The secondary wastes, which include spent ion-exchange resins and GAC, would be managed as dangerous wastes. The secondary wastes will be disposed at Environmental Restoration Disposal Facility (ERDF) or transported to a RCRA-permitted facility for appropriate treatment and final disposal based on the waste=s capability to meet the waste acceptance criteria. The total cost of implementation of the IRA for three years (1996, 1997, and 1998) is $5,715,000. The details of construction, operation and maintenance are described in Table 2

9.3 Alternative 3: Groundwater Pump and Treat using Effluent Treatment Facility (ETF)

This alternative will consist of extracting groundwater, pumping the groundwater to the ETF via an existing pipeline, and treating it to remove uranium and technetium-99 to meet the goals of the IRA. Additionally, the co-contaminants of nitrate and carbon tetrachloride will be removed at the ETF. The treated groundwater will then be returned to the soil column at the State-Approved Land Disposal Site (SALDS) located north of 200 West Area. The treatment process at the ETF would involve transfer of contaminated groundwater, through an existing single-walled PVC pipeline, from 200-UP-1 OU to the Liquid Effluent Retention Facility (LERF) surface impoundment for temporary storage before treatment at the ETF (Figure 8). Groundwater monitoring of the contaminant plume would continue during the IRA.

Prior to transfer of the groundwater to the ETF, and during construction of the connecting pipelines, the U.S. DOE will continue operating the existing on-site treatability test. This current treatability test will continue until startup (approximately 12 months) without secondary containment for tank systems, as compliance with those requirements would interrupt treatment and is not practicable considering the exigencies of the situation.

Once the connections to the ETF are completed, and groundwater from 200-UP-1 OU is being treated successfully at the ETF facility, this remedy would be considered to be in place and the onsite treatability test equipment would be shutdown and dismantled.

The main treatment train at ETF consists of several treatment steps for the removal and destruction of contaminants in the contaminated groundwater. The major components of this system are:

- Degassification: Removes dissolved gases such as carbon dioxide and oxygen from the groundwater. The system is equipped with high-efficiency particulate air and charcoal filtration prior to discharge.

- Reverse osmosis: Removes the majority of dissolved solids including: uranium and the co-contaminant nitrate.

- Ultraviolet oxidation: Destroys organics including the co-contaminant carbon tetrachloride.

- Ion exchange: Provides a final polishing step for dissolved solids removal and is typically necessary to meet U.S. DOE limits for radionuclide releases. Details will be provided in the Remedial Design Report/Remedial Action Work Plan (RDR/RAWP).

Secondary waste resulting from processing the 200-UP-1 OU groundwater may be disposed in the ERDF, or a RCRA-permitted facility, provided that waste acceptance criteria are met. The treated liquid effluent will be discharged at the SALDS upon verification that the concentration of nitrate is at or below 3,800 ppb and the concentration of carbon tetrachloride is at or below 5 ppb. The removal efficiency of the ETF for radionuclides is typically 99 percent. Therefore, the effluent concentrations of uranium and technetium-99 are expected to be verified as at or below 16.4 ppb and 30 pCi/L, respectively.

Because of the presence of carbon tetrachloride as a listed waste in the groundwater, the provisions of WAC 173-303-650 for surface impoundment would be applicable to the management of the groundwater from 200-UP-1 OU at the LERF. The State of Washington dangerous waste rules apply to the ETF operations and the disposal of secondary wastes. The total cost of implementation of the IRA for three years (1996, 1997, and 1998) is $4,169,000. The details of construction, materials and maintenance are described in Table 3. No additional labor cost is included for treatment at the ETF. The labor force necessary is already present and funded due to the requirements for operation of the facility to treat process condensate and other streams.

Table 3. Pump and Treat Cost Using the Effluent Treatment Facility

($ x 1000)	FY 1996	FY 1997	FY 1998
Operations & Maintenance Labor 1,2		0	0
Consumables (Chemicals, IX Resin) 3		35	35
Waste Disposal 4		8	8
Sampling 5		130	130
Electrical 6		200	200
Modify ETF Process 7	250		
Connect UP-1 to Transfer Line 9,10	365		
Connect Transfer Line to LERF 9,10	262		
Phase 1 Onsite Treatment 8	1059		
Pump Groundwater 11	50	50	50
Monitor Aquifer Cleanup 12	279	279	279
Well Installation 8	277		
Data Management/Reporting 8	57	57	57
Escalation (2.3%)		17	35
Total Cost to Treat Groundwater	2599	776	794

1. Assumes groundwater is pumped continuously at 50 gpm through September 1998. The water would be treated by the UP-1 pilot-scale system until transfer to the ETF/LERF begins. Groundwater would be processed by the ETF at an average of 80 gpm. This Table assumes 24 months of 50 gpm flow (52,560,000 gal total) are treated at the ETF. Phase 1 Onsite treatment costs and ETF costs can be pro-rated as appropriate for different schedule scenarios.
2. No additional labor force is required to support UP-1 ground water treatment at the ETF. The labor force necessary is already present and funded due to the requirements for operation of the ETF to treat evaporator condensate and other streams such as the N-Basin water. The FY98 5-year Plan Target Budget assumes a $2.5M cost efficiency is achieved due to merger of 200 Area Liquid Effluent Operations with the 242-A Evaporator operation.
3. Includes $25K/year for sulfuric acid, sodium hydroxide, and hydrogen peroxide; and $10K/year for ion exchange resin.
4. Groundwater at 50 gpm and 1000 ppm TDS average produces 3510 ft3/year solid waste; disposal in ERDF @ $55/cy (unit cost provided by ERC),
5. Groundwater at 50 gpm fills 43.8 verification tanks at 600,000 gal/verification tank; sampling for environmental compliance costs $3000/verification tank.
6. Electrical cost is energy and demand charges of $30K/month when ETF is operating, minus energy and demand charges of $ 10K/month if ETF is not operating. Assessment to maintain site electrical system is not included as this would be paid by the site regardless of whether groundwater is treated in the ETF.
7. Includes design/engineering, piping changes, control system reprogramming, procedure updates, and training.
8. Estimate provided by ER.
9. Assumes flow monitoring with leak detection are acceptable alternatives to double-containment.
10. Includes construction, design, engineering/inspection, construction management, quality support, project management, general support, and contingency.
11. Same as Utilities cost for ER pilot-scale system.
12. Same as Performance Monitoring cost for ER pilot-scale system.

NOTE: If re-injection water was desired ERC estimates raw water could be supplied at a cost of 2 cents per gallon including hook-up cost. This would add $526K to the cost in FY97 and FY98.

10.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

10.1 CERCLA Nine Criteria

This section summarizes the relative performance of each of the alternatives with respect to the nine criteria identified in the National Contingency Plan (NCP). The nine criteria fall into three categories. The first two criteria (overall protection of human health, and the environment and compliance with ARARs) are considered threshold criteria and must be met. The next five criteria are considered balancing criteria and are used to compare technical and cost aspects of alternatives. The final two criteria (state and community acceptance) are considered modifying criteria. Modifications to remedial actions may be made based upon state and local comments and concerns. These were evaluated after all public comments were received.

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A description of the nine evaluation criteria contained in the NCP, and a brief analysis of each alternative against the criteria is presented in the box below.

EXPLANATION OF CERCLA EVALUATION CRITERIA

Threshold Criteria:

1. Overall Protection of Human health and the Environment - How well does the alternative protect human health and the environment, both during and after construction?

2. Compliance with Applicable or Relevant and Appropriate Requirements - Does the alternative meet all Federal and state applicable or relevant and appropriate requirements (ARARs)?

Balancing Criteria:

3. Long-Term Effectiveness and Permanence - How well does the alternative protect human health and the environment after completion of cleanup? What, if any, risks will remain at the site?

4. Reduction of Toxicity, Mobility, or Volume Through Treatment - Does the alternative effectively treat the contamination to significantly reduce the toxicity, mobility, and plume of the hazardous substances?

5. Short-Term Effectiveness - Are there potential adverse effects to either human health of the environment during construction implementation of the alternative. How quickly does the alternative reach the cleanup goals?

6. Implementability - Is the alternative both technically and administratively feasible? Has the technology been used successfully on other similar sites?

7. Cost - What are the estimated costs of the alternative?

Modifying Criteria:

8. State Acceptance - What are the state's comments or concerns about the alternatives considered and about EPA's preferred alternative? Does the state support or oppose the preferred alternative?

9. Community Acceptance - What are the community's comments or concerns about the preferred alternative? Does the community generally support or oppose the preferred alternative?

10.1.1 Overall Protection of Human Health and the Environment

Alternative 1, the no-action alternative, will not protect human health and the environment. The contaminated groundwater would continue to migrate from the 200 Area and have adverse impacts on downgradient groundwater, and eventually the Columbia River.

Alternative 2, continue to use the existing onsite system, would remove contaminant mass from the aquifer and contain the high concentration area of the plumes for uranium and technetium-99. Carbon tetrachloride associated within the high concentrated portion of uranium and technetium-99 plumes will also be removed. Nitrate would not be treated by this alternative.

Alternative 3, treatment at the ETF, would remove uranium and technetium-99 from the aquifer and contain the high concentration portion of the plumes. Carbon tetrachloride and nitrate associated within the highly concentrated portion of uranium and technetium-99 plumes will also be treated. Therefore, it will achieve a greater degree of overall protection of human health and the environment than the other alternatives, since the co-contaminants of nitrate and carbon tetrachloride are removed and destroyed, respectively.

10.1.2 Compliance with ARARs

Major ARARs for this IRA include state underground injection standards, state drinking water and groundwater quality standards, state dangerous waste designation and management standards (for extracted groundwater and secondary wastes that might have contacted the groundwater), Federal land disposal restrictions, and air emission standards (e.g., for venting releases from tanks or piping). The MTCA is a chemical-specific ARAR that establishes requirements (one of which is meeting drinking water standards) for groundwater cleanup. Final remediation goals must attain MTCA requirements. This IRA is an interim action designed to reduce risk until a final remedy is selected, but is not in itself a final remedy for groundwater.

Alternative 1 would not meet ARARs and would not satisfy this criteria.

Alternative 2 is intended to meet the state underground injection program standards, which prohibits injecting fluid into groundwater that would cause the groundwater to exceed drinking water standards or otherwise affect beneficial uses. Extracted groundwater would be treated at the onsite system to reduce concentrations of technetium-99 and carbon tetrachloride to below drinking water standards, and concentrations of uranium to below MTCA groundwater cleanup standards. The treated groundwater would be injected to the existing contaminant plume, so there would be no reduction in beneficial uses. Dangerous waste requirements would be met by upgrading the onsite system to provide secondary containment for all tank systems and piping and disposing of secondary wastes at either the ERDF or a RCRA-permitted facility. Radioactive air emissions from the system would be monitored as appropriate to ensure that releases do not have the potential to cause significant offsite doses as defined by the Notice of Construction. Non-radiological (toxic) air emissions have been estimated to be below regulatory limits.

Alternative 3 is intended to satisfy state drinking water standards and state groundwater quality standards. Extracted groundwater would be treated at the ETF to reduce concentrations of all constituents as discussed in Section VIII. Dangerous waste management requirements would be met by the current design of the LERF and the ETF, which meet RCRA standards for a treatment facility, and by treating the extracted groundwater to reduce concentrations of carbon tetrachloride to levels below health-based limits, such that the agencies can determine it no longer contains a hazardous waste. Radioactive and nonradioactive air emissions will be controlled and monitored in accordance with the Notice of Construction approvals previously granted to the ETF.

10.1.3 Long-Term Effectiveness and Permanence

The no-action alternative provides no long-term effectiveness or permanence. Alternative 2 and Alternative 3 may not, by themselves, achieve long-term effectiveness and permanence. However, contaminant removal and containment through pump-and-treat would provide a long-term and permanent reduction in risk and in contaminant migration. At the same time, Alternative 2 and Alternative 3 would improve the potential for future final remedies to be implemented that will achieve long-term effectiveness and-permanence. Furthermore, by utilizing the ETF, Alternative 3 addresses more contaminants and permanently destroys carbon tetrachloride.

10.1.4 Reduction of Toxicity, Mobility, or Volume

The no-action alternative provides no reduction of toxicity, mobility, or volume through treatment. Alternative 2 and Alternative 3 would provide treatment of the groundwater co-contaminants, thereby reducing the volume of contaminants that are migrating and reduce the overall toxicity risk of the groundwater. Furthermore, by using the ETF, Alternative 3 reduces the concentration of a greater number of contaminants through treatment.

10.1.5 Short-Term Effectiveness

The no-action alternative has no short-term effect on the contamination. Alternative 2 and Alternative 3 would offer short-term effectiveness by limiting the migration of the contamination and by reducing the most significant contamination in the areas of highest concentration. Short term risk due to workers can be easily managed through standard remedial action and construction procedures. Mitigation measures will include actions to minimize dust, use of protective equipment to minimize worker exposures, minimize disturbance to wildlife, and revegetation of the site as appropriate.

10.1.6 Implementability

The no-action alternative can be easily implemented, because no changes would be made to the site. Alternative 2 started as a pilot project in 1994 and was successful in removing uranium, technetium-99 and carbon tetrachloride. The existing onsite system uses ion exchange resins to remove radionuclides and GAC to remove carbon tetrachloride. A modification required for implementing Alternative 2 would be to provide double containment of the treatment system, which is implementable. Alternative 3 could be easily implemented using the existing available ETF. The ETF is a state-of-the-art treatment facility which can treat a wide range of contaminants of radionuclides, organics and inorganics. The system has been tested for a range of contaminants and can be used to treat 200-UP-1 OU groundwater. An existing pipeline will be used to transfer the 200-UP-1 OU water to the LERF basins. Transfer pipelines will be constructed to connect the 200-UP-1 OU groundwater wells to the transfer line in the 200 West Area, and another will be constructed to tie the transfer line to the LERF basins in the 200 East Area.

10.1.7 Cost

The no-action alternative has essentially no added cost. The detailed cost estimates for Alternative 2 are presented in Table 2. The total estimated cost for the Alternative 2 is $5,715,000 for three years (i.e. 1996, 1997, and 1998). This cost includes the cost for installing the double containment of the system in addition to other costs (e.g., operation, maintenance, waste disposal, monitoring, etc.). The detailed cost of Alternative 3 are presented in Table 3. The total estimated cost for Alternative 3 is $4,169,000 during the same time period of three years. This cost includes construction of connecting pipelines, process monitoring, and waste disposal. No additional labor cost is included for treatment at the ETF. The labor force necessary is already present and funded due to the requirements for operations of the facility to treat process condensate and other streams.

10.1.8 State Acceptance

The State of Washington concurs with the selection of the interim remedial action described in this ROD.

10.1.9 Community Acceptance

This action was first proposed as part of the fourth amendment to the Tri-Party Agreement and received favorable comments from the public. Community acceptance of the alternatives was evaluated during two public comment periods as described in Section III of this ROD. The identification of the selected alternative that utilizes the ETF for treatment was based on public comment. A summary of public comments on the IRA is provided in the Responsiveness Summary attached to this interim action ROD.

10.2 Evaluation of Potential Environmental Impacts

Impacts are expected to be limited to potential exposure of remediation workers to hazardous or radioactive substances, short-term indirect impact to wildlife from construction noise, and disturbance of the land area designated to wells, equipment and facilities. Removal of groundwater contamination is expected to improve rather than degrade the ecological conditions of the area.

The cumulative impacts of implementing reasonable foreseeable remedial actions in the 200 West Areas are generally expected to improve ecological conditions in the 200 Areas in the long term. The sites to be impacted by the interim remedial actions are located within the 200 Areas, previously disturbed by the operations at the Hanford Site. Because of the previous disturbance, ecological or cultural resources are not expected to be impacted by the interim remedial action.

11.0 SELECTED REMEDY

The components of the selected remedy achieve the best balance of the nine evaluation criteria described in Section IX. The total estimate cost of the remedy is approximately $4.2 million.

The selected remedy uses groundwater pumping by extraction wells to capture the contaminant plume for mass removal and treatment at the ETF. It is intended to minimize the migration of uranium and the technetium-99 from the 200 West Area. In addition, the concentrations of nitrate and carbon tetrachloride will be reduced in the groundwater. The IRA is intended to stabilize and reduce contaminant mass in the high concentration area of the plume. In general, the high concentration portion of the plume corresponds to the area greater than ten times cleanup levels for of uranium (48 ppb) and technetium-99 (900 pCi/L. The selected remedy for the interim actions at the 200-UP-1 OU will include, at a minimum, the following activities.

11.1 Groundwater Extraction

Groundwater from the 200 West Area will be pumped from the existing extraction well(s) at a rate of 190 liters/min (50 gpm). The extraction rates and the well locations may be modified upon the approval of the lead regulatory agency based on the future behavior of the aquifer, the response of the contaminant plume to further pump and treat activities, the rate of removal of the mass of contaminants, and other considerations of the long-term operations and maintenance of the extraction and treatment system. The groundwater extraction rate of 190 liters/min (50 gpm) is expected to be sufficient to meet the remedial action objectives.

11.2 Construction Requirements

Under the ETF treatment option, water from the 200-UP-1 OU extraction wells will be pumped directly via an existing underground single walled pipeline to the surface impoundment known as the LERF, where it would be temporarily stored for treatment at the ETF. The LERF is a double contained, RCRA-permitted facility.

Several enhancements will be necessary to the groundwater transfer system prior to operations. These include additional piping in the 200 West area to connect the groundwater transfer system to the 200-UP-1 OU groundwater well(s). In the 200 East Area, piping will be installed to connect the system to the LERF. Engineering evaluations for pipeline connections were completed in November 1996.

Appropriate instrumentation and other required controls and monitoring devices, as needed during the course of operations, will be installed in the transfer system. Prior to placing the transfer system into operation it will undergo an operational test, which will test the system under operating conditions.

Details of the construction, design and monitoring and other detailed requirements will be described in the RDR/RAWP and approved by Ecology, the lead regulatory agency. In addition, this plan shall include at least the following elements:

- Construction will comply with appropriate worker safety requirements.

- U.S. DOE will consult with the Department of Fish and Wildlife and other resource management agencies, to ensure that the activities should avoid or minimize disruption to local wildlife and other natural resources to the extent practicable.

- For areas that are disturbed during construction and operation, U.S. DOE plans to revegetate following construction in those areas that are not needed for operation and maintenance of the treatment system and where the land is not expected to be redisturbed within the next few years by other site activities.

- To the extent practicable, facilities are to be designed and located in a manner that minimizes interference with and interference by remedial actions for the source waste sites or other planned activities.

- Sites with cultural resource significance should be avoided during remedial activities, if avoidance is possible. To date, no sites of cultural resource significance have been identified. Where avoidance is not possible, U.S. DOE has agreed to prepare a data recovery/mitigation plan in consultation with the affected resource trustee and carried out for each site impacted by remedial activities.

- Prior to transfer of the groundwater to the ETF, and during construction of the connecting pipelines, the U.S. DOE will continue operating the onsite treatment system. This current treatability test will be allowed to continue without secondary containment for tank systems (it would not be practicable to install the secondary containment considering exigencies of the situation because it would interrupt treatment). Once the connections to the ETF are completed, and groundwater from 200-UP-1 OU is being treated successfully at the ETF, this remedy would be considered to be in place and the onsite treatability test equipment would be shutdown and dismantled.

11.3 Groundwater Treatment

The contaminants of concern that ETF will treat as a part of the IRA are uranium and technetium-99. In addition, the ETF will remove the nitrate co-contaminant and destroy the co-contaminant of carbon tetrachloride. A complete discussion of the treatment components is presented under Section 9, Description of the Alternatives. The following two subsections (Sections 11.3.1 and 11.3.2) describes several unique considerations of the treatment of the contaminated groundwater and the subsequent handling requirements of the treated effluent discharge, as well as secondary waste streams.

11.3.1 Treatment Modification

The groundwater extracted from 200-UP-1 OU is not a characteristic hazardous waste, but contains carbon tetrachloride as a listed hazardous waste. The waste water be treated in the ETF to meet the current discharge standards contained in the State Waste Discharge Permit ST-4500. During the treatment of 200-UP-1 OU groundwater, the limits for carbon tetrachloride and nitrate are 5 ppb and 3,800 ppb, respectively. Because these discharge standards are below the MCLs and other health-based levels, the regulatory agencies have determined that, after treatment and verification analyses, the groundwater will no longer contain any listed RCRA hazardous waste. The treated groundwater will satisfy the LDRs since the discharge standards in the State Waste Discharge Permit, which are incorporated herein by reference, are below the applicable 40 CFR 268.40 treatment standards. The LERF and the ETF will need to segregate the storage and treatment of this contaminated groundwater (media) from the storage and treatment of the listed waste currently using these facilities. Any contaminated groundwater that is mixed with the 242-A process condensate listed waste at the LERF and/or ETF, either accidentally or in the process of cleaning or emptying the surface impoundments and the ETF may be disposed only if the treated water meets the de-listing criteria in 40 CFR 261, Appendix IX, Table 2, and as part of the maximum allowable volume of de-listed material under that rulemaking. Because the 200-UP-1 OU groundwater will no longer contain listed waste after treatment and because it will be segregated from other listed hazardous waste treated at ETF, the volume of this groundwater being treated will not be applied toward the volume limit under the RCRA de-listing rule. This operational requirement to segregate these waste streams will be eliminated if the contaminated groundwater is included in a future RCRA de-listing modification.

11.3.2 Effluent and Waste Disposal

The ETF process consists of a main treatment train and a secondary train. The main train discharges treated water and the secondary train results in drums of concentrated contaminants in the form of dry powder. The treated effluent from the 200-UP-1 OU will be temporarily stored in the ETF verification tanks until compliance with the discharge limits is verified. The treated water is then discharged to the state-approved land disposal site (SALDS) north of the 200 West Area. The location of the SALDS was chosen because of its slow local groundwater migration rate. The secondary derived solid waste from the ETF operation, including spent ion exchange resin, is a hazardous waste and will be managed in accordance with RCRA ARARs. This waste will be disposed of in the ERDF or other approved facility after meeting RCRA ARARs and other waste acceptance criteria.

11.4 Compliance Monitoring - Effluent Discharge

The data collection, analysis, and evaluation procedures used to determine compliance with cleanup levels and liquid effluent disposal limits shall be as defined in the State Waste Discharge Permit ST-4500.

11.5 Human Access Institutional Controls

Institutional controls are required to prevent human exposure to groundwater. The U.S. DOE is responsible for establishing and maintaining land use and access restrictions until the final remedy is selected and implemented. Institutional controls include placing written notification of the remedial action in the facility land use master plan. The U.S. DOE will prohibit any activities that would interfere with the remedial activity without the lead agency=s concurrence. In addition, measures necessary to ensure the continuation of this restriction will be taken in the event of any transfer or lease of the property before the final remedy is selected. A copy of the notification in a land use plan will be given to any prospective purchaser/transfer before any transfer or lease. U.S. DOE will provide Ecology and EPA within written verification that these restrictions have been put in place.

11.6 Shutdown and Decommissioning of the Onsite System

The 200-UP-1 OU RCRA-permitted system will be deactivated and placed in stand down condition when water is sent to the LERF. Decommissioning of the onsite system will take place only after satisfactory treatment and disposal of 200-UP-1 OU groundwater at the ETF has been demonstrated.

11.7 Schedule

U.S. DOE will start pumping groundwater to LERF by March 30, 1997, and will continue to pump at an average rate of 190 liters/min (50 gpm) to exchange one pore volume of groundwater. It is estimated that pumping at 190 liters/min (50 gpm) for 2.5 to 3 years to treat one pore volume. A detailed schedule of construction, testing, etc. will be provided in the RDR/RAWP and associated documents. The goals of the IRA are to reduce the uranium and technetium-99 concentrations in the groundwater to 10 times the cleanup level, and to remove the mass of these contaminants in order to contain the contaminant plume and reduce potential downgradient risks.

12.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121, selected remedies must be protective of human health and the environment, comply with ARARs, be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that significantly and permanently reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

CERCLA Section 104(d)(4) states where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat to the public health or welfare of the environment, the President may, at his discretion, treat these related facilities as one for the purpose of this section.

The preamble to the NCP clarifies the stated EPA=s interpretation that when noncontiguous facilities are reasonable close to one another and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred between such facilities without having to obtain a permit. Therefore, the ETF, ERDF and the 200-UP-1 OU are considered to be a single site for response purposes under this interim action ROD.

12.1 Protection of Human Health and the Environment

The selected remedy protects human health and the environment through groundwater remediation. This action will reduce the highest concentration area of the contaminated plume of uranium and technetium-99, thereby reducing potential adverse impacts to downgradient areas. Implementation of this remedial action will not pose unacceptable short term risks to site workers. The selected remedy is the best alternative as it uses the state of art technology and will remove, not only the contaminants of concern, but also additional contaminants such as nitrate and carbon tetrachloride.

12.2 Compliance with ARARS

The following state and federal ARARs have been identified for this interim remedial measure:

<u>12.2.1 Chemical-Specific ARARs</u>

Safe Drinking Water Act (SDWA), 40 CFR 141, Maximum Contaminant Levels, for public drinking water supplies are relevant and appropriate for setting groundwater treatment levels. The treatment train will meet MCLs for carbon tetrachloride, technetium-99, nitrate and the estimated MCL for uranium (20 ppb).

The Model Toxic Control Act regulation (WAC 173-340) is applicable for setting groundwater treatment levels for uranium.

The groundwater removed will be treated to achieve these levels before discharge. However, the underlying groundwater will not be treated to achieve these levels. This interim action is only part of a total remedial action and is cost effective. Therefore these ARAR requirements at this time is being waived pursuant to Section 121(d)(4)(A) of CERCLA.

<u>12.2.2 Action-Specific ARARs</u>

LDRs (40 CFR 268) are applicable for the extracted groundwater as well as for secondary waste (protective clothing, sampling equipment, etc.) that comes in contact with the contaminated water.

RCRA Subtitle C (40 CFR 264) hazardous waste treatment, storage, and disposal requirements are applicable to design and operation of the treatment system.

"Surface Impoundments" (WAC 173-303-650) provides guidance for surface impoundment which are applicable to the management of the groundwater from the 200-UP-1 OU at the LERF and subsequent treatment at the ETF.

"Minimum Standards for Construction and Maintenance of Wells" (WAC 173-160 and WAC 162) are applicable for the location, design, construction, and abandonment of water supply and resource protection wells.

"Dangerous Waste Regulations" (WAC 173-303) establish the standards for persons who generate, transport, treat, store, or dispose dangerous wastes. This regulation is applicable to the management and transportation of groundwater contaminated with carbon tetrachloride, the design and operation of the ETF, and the management and disposal of secondary waste from treating the groundwater at ETF.

"National Emission Standards for Hazardous Air Pollutants" (40 CFR 61, Subpart H), and "Radiation Protection, Air Emissions" (WAC 246-247) are applicable to potential radioactive air emissions resulting from transfer and treatment of contaminated groundwater.

"Air Pollution Regulations, New and Modified Emission Units" (WAC 173-460) establishes acceptable source impact levels for carcinogenic and acutely toxic air pollutants. This is applicable to carbon tetrachloride emissions resulting from groundwater transfer and treatment. The IRA will achieve the air emission criteria by destruction of the carbon tetrachloride through ultraviolet oxidation.

12.2.3 Location-Specific ARARs

- National Historic Preservation Act (16 U.S.C. 470, et. seq.) Is relevant and appropriate to actions in order to preserve historic properties controlled by a federal agency.
- Endangered Species Act (16 U.S.C. 1531, et. seq.) Applicable for activities that threaten the continued existence of listed species or destroy critical habitat.
- National Archeological and Historic Preservation Act (16 U.S.C. 469) Requires action to recover and preserve artifacts in areas where activity might cause irreparable harm, loss, or destruction of significant artifacts.

12.2.4 Other Criteria, Advisories, or Guidance to be Considered for this Remedial Action

- The Future for Hanford: Uses and Cleanup, the Final Report of the Hanford Future Site Uses Working Group, December 1992.

The ERDF waste acceptance criteria establishes chemical, radiological, and physical standards for disposal of wastes to ERDF. It is applicable to any secondary waste from ETF or waste from shutdown of the existing site treatment system proposal for disposal at ERDF.

12.3 Cost Effectiveness

The selected remedy provides overall effectiveness proportional to its cost. Costs are summarized on Table 1. While the costs of treatment at the ETF are similar to those of continued use of the existing onsite treatability system, additional contaminants will be treated. This will have significant additional environmental benefit.

12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Possible

Because this action does not constitute the final remedy for this OU, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed by the final response action. Subsequent actions are planned to address fully the threats posed by conditions at this OU. The selected remedy does rely on state of the art treatment technologies at the ETF that will result in permanent destruction of carbon tetrachloride.

12.5 Preference for Treatment as a Principal Element

The selected remedy utilizes an effective treatment process for the removal of uranium, technetium-99, and nitrate, and permanently destroys carbon tetrachloride.

13.0 DOCUMENTATION OF SIGNIFICANT CHANGES

Ecology reviewed all written and verbal comments submitted during the original public comment period. As a result of these comments, the three parties considered the use of the Effluent Treatment Facility for treatment of the 200-UP-1 OU groundwater. Based on the comparison of the RCRA-permitted treatment system to the ETF, the selected remedy was revised to consider the ETF for treatment of the 200-UP-1 OU groundwater. A second public comment period was held to describe the proposed change to the selected remedy. Subsequently, public comments were received during the second comment period.

U.S. DOE HANFORD 200 WEST AREA 200-UP-1 OPERABLE UNIT

RESPONSIVENESS SUMMARY

The U.S. Department of Energy (U.S. DOE), the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) held a public comment period from August 8, 1995, to October 6, 1995, and from August 5, 1996, to October 4, 1996, for interested parties to comment on the 200-UP-1 Proposed Plan and Focus Sheet, respectively. These documents present the preferred alternative for the groundwater located in the 200-UP-1 Operable Unit of the Hanford Site=s 200 West Area. The primary support documents for this action are the 200 West Groundwater Aggregate Area Management Report and the Engineering Evaluation/Conceptual Plan for the 200-UP-1 Operable Unit Interim Remedial Measure with an accompanying transmittal letter dated April 24, 1996.

This action was presented and discussed at the April 1996 and September 1996 Hanford Advisory Board meetings. These meetings were open to the public and the public was encouraged to comment on issues. The public was informed of the opportunity to comment on the Proposed Plan and Focus Sheet by publication in the Seattle Post-Intelligence/Seattle Times, the Spokane Spokesman Review-Chronicle, the Tri-City Herald, and the Oregonian on August 8, 1995, and August 5, 1996; and by mailing a fact sheet to approximately 2,000 people. A public meeting was also held on September 1995.

A responsive summary is required by the Comprehensive Response Compensation and Liability Act (CERCLA), for the purpose of providing the agencies and the public with a summary of citizens' comments and concerns about the site, as raised during the public comment period, and the agencies' response to those comments and concerns.

I. RESPONSIVENESS SUMMARY OVERVIEW

The Hanford Site was established in 1943 to produce plutonium for nuclear weapons using nuclear reactors and chemical processing plants. Operations at the Hanford Site are now focused on environmental restoration and waste management.

The 200 West Area is an operational area of approximately 3.2 square miles where spent nuclear fuel was processed in four main facilities: U Plant (primarily uranium recovery); Plutonium Finishing Plant (primarily plutonium separation and recovery); and S and T Plants (primarily uranium and plutonium separation from irradiated fuel rods). The 200-UP-1 OU is located within the 200 West Area of the Hanford Site, and was included on the NPL in July 1989.

Contamination in the 200-UP-1 OU resulted from historic discharges to five primary liquid waste disposal sites. These five sites are at cribs 216-U-1, 216-U-2, 216-U-8, 216-U-12, and 216-U-16. The predominant contaminants in the waste stream were uranium and technetium-99. It is estimated that 4,000 kg (8,800 lb) of process waste from Uranium Oxide (UO3) Plant, consisting primarily of dilute nitric acid containing uranium, technetium 99 and small quantities of other fission products, was discharged to the soil columns via two cribs (216-U-1 and 216-U-2) between 1951 and 1968. Most of these contaminants were initially retained in the upper 20 m (65 ft) of soil. During the final years of Crib operation (1966 through 1968), highly acidic wastes were disposed, which resulted in mobilizing the contaminants. The mobile uranium was transported to groundwater when large volumes of cooling water was discharged to the adjacent 216-U-16 Crib in 1984. A pump and treat action was initiated in 1985 that removed 680 kg (1,500 lb) of uranium, reduced contaminant levels resulting in the concentrations present today (DOE-RL 1993).

During 1993, DOE-RL completed AAMS that compiled and evaluated information about source and groundwater contamination in the 200 West Area. Recommendations generated from the AAMS included interim actions to accelerate removal and limit the potential spread of contamination where information is sufficient to successfully plan and implement the actions. For the 200-UP-1 OU, the area containing the highest concentration of uranium, technetium-99 and nitrate was recommended for an IRA. Subsequently, it was determined that nitrate should be removed from consideration as a contaminant of concern for this remedial action because the nitrate plume emanating from the 200 West Area is so extensive. Treatment of the portion of the nitrate plume within 200-UP-1 OU will not result in a significant reduction in the overall nitrate plume.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The public has been involved in the cleanup of the Hanford Site since the Hanford Federal Facility Agreement and Consent Order was signed in 1989. Over the past several years a number of stakeholder work groups and task forces have been used to enhance decision making at the Hanford Site. In January 1994, the Hanford Advisory Board was established to provide informed advice to the U.S. DOE, EPA, and Ecology.

A consistent message delivered by interested citizens and affected Indian Nations is to take early action on groundwater contamination and protect the Columbia River. Taking this action will help support these desires.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND THE AGENCIES RESPONSE TO THOSE COMMENTS

Comments received during the public comment period are presented in this section. Responses to the comments follow each comment. Copies of all comment letters received are attached to this responsiveness summary as Appendix A.

Question. The Hanford Advisory Board endorses remediation of uranium and technetium-99 plume of the 200-UP-1 using the Effluent Treatment Facility.

Response: The agencies agree that this action should proceed.

Question. During the first public comment period of the proposed plan in 1995, public comments reflect overwhelming support for taking an active action to consider use of ETF for the treatment of extracted contaminated groundwater from the 200-UP-1 Operable Unit. Public is of the opinion that the ETF is a state-of-art facility capable of treating and removing various contaminants, including organics, inorganics and metals, it minimizes waste and must be used.

Response: The three parties agreed to consider the use of the ETF and recommended the U.S. DOE to carry out a detailed engineering evaluation of the proposal. The U.S. DOE prepared an Engineering Evaluation and Cost Analysis Plan which provides details of the use of ETF. The transmittal letter of this document provides details of the Record of Decision to use the ETF for the treatment of groundwater from the 200-UP-1 OU.

Question: Please provide the budget basis or estimate for maintenance and operations in full time equivalent employees including operators, engineers, health physics, management, safety, QA, maintenance crafts and support for the 200-UP-1 onsite system.

Response: Approximately 3 full time equivalent employees will be required to safely and efficiently operate the treatment system. Additional cost details are available in the "Engineering Evaluation/Conceptual Plan for the 200-UP-1 Groundwater Operable Unit Interim Remedial Measure" report, BHI-00187.

Question: What is the cost for a cubic ft of resin?

Response: Approximately $180 per cubic foot.

Question: What is the cost for disposal of a drum of waste?

Response: Waste disposal, as estimated, will cost approximately $55 per cubic yard.

Question: Since the source has been halted, what changes over time might be expected to the constituents of this plume? What is the half-life for technetium-99? How fast does the plume move? What dilutions are expected?

Response: The primary constituents of this plume, uranium and technetium-99 will move with the groundwater and will decay. Nitrate concentrations are likely to be reduced to some extent by bacteriologically driven denitrification, but will remain well above drinking water standards for an extended period of time (no calculations of the rate of natural denitrification have been made). The half-life of technetium-99 is 212,000 years. Under the hydraulic conditions present today the plume is moving at a rate of about 120 ft/year. Dilution of the plume under unaltered flow would be due to dispersion and advection and would amount to about 10 percent year.

Question: Is the land on the Hanford Reservation currently under government ownership?

Response: Yes.

Question: Couldn't the land downgradient of any plumes or potential plumes from Hanford Remain in government ownership in order to restrict uses (such as drilling drinking wells) that could result in exposures? Wouldn't this in fact also preserve it as wild open space, which is an ecologically desirable objective?

Response: Retention of federal ownership is indeed an option. Sale of the land with deed restrictions is also an option. Maintenance of the land as open desert is an option.

Question: If the objective of the cleanup is for the government to later sell the land for future residential development, does the cost for this development opportunity make any economic sense at all when compared to the cost of keeping the area undeveloped?

Response: Contamination in the groundwater will eventually reach the Columbia River even if the land is left undeveloped. The Hanford Future Site Users Group recommended that the long-term uses of the site should include unrestricted use or access to the area away from the 200 Area Plateau. The land use recommendations by that group were considered in the development of the Proposed Plan.

Question: Is there any logical basis to assume that future site uses will be thrown open to the public to flock to home sites and to drink well water from Hanford? My thoughts are that no matter how good a cleanup is ever achieved, the public really isn't going to be willing to do this anyway.

Response: Current federal and state laws require remediation of contaminated groundwater which is a potential drinking water source. Hanford groundwater is considered a potential drinking water source. Furthermore, contamination in the groundwater will eventually reach the Columbia River, even if the land is left undeveloped.

Comment: The Public is concerned regarding the possible loss of jobs if ETF is not used.

Response: It is the responsibility of the Tri-Parties to select the most cost effective and environmentally acceptable means to address the 200-UP-1 groundwater contamination. In that regard, all treatment options will be assessed, including use of the ETF.

Question: Public is concerned regarding loss of jobs if ETF is not used.

Response: It is the responsibility of Ecology to select the most cost effective and environmentally acceptable means to address the 200-UP-1 groundwater contamination. In that regard, all treatment options will be assessed, including use of the ETF.

Question. If the Effluent Treatment Facility (ETF) has the capacity to handle 180 gallons per minute of waste water, and the UP4 were to provide a base load of 50 gallons per minute, would the effective cost of treatment equal 50/180 of the operating cost of the ETF?

<IMG SRC 97048KA>

Question. Proposers of using the Pilot-Scale Treatment plant offered information on the treatment efficiency of their operation. As Ms. Wanek stated the target operating efficiency for FY-1996 is 80%. Before any move is made to make ETF the sole or partial treater of the water, please provide similar operating data for that facility.

Response: The ETF is designed to operate at an operating efficiency of 72 percent. During the first year of operation it has not been necessary for the ETF to operate at the design operating efficiency. The first-year of operation of the ETF are not representative of the ETF's capabilities. During this period the ETF has undergone testing, equipment modifications, and equipment problems that invalidate any determination of operating efficiency. The ETF is designed to treat 150 gallons per minute (78 million gal/yr). Groundwater will be supplied to the ETF at a rate of 26 million gallons per year, other feeds to the ETF are anticipated to be less than 10 million gallons per year, for a total of less than 40 million gal/yr. As a result, even with the UP-1 groundwater, the ETF still has excess capacity and will only need to operate at an efficiency of 51 percent during the IRA.

Question. Proponents of the ETF made numerous mention of the facility being double contained, is the pipeline from 200 West Area to the ETF also double contained ?

Response: The piping between 200 West and the Liquid Effluent Retention Facility (LERF) is not double contained. This transfer line was constructed of single wall PVC pipe in 1994. The pipeline has been hydrotested, and is proposed to be equipped with flow monitoring equipment prior to the transfer of the UP-1 groundwater.

Question. Please address the issue of listed waste, and how disposal of water which has been in contact with the listed material (carbon tetrachloride) can be accomplished through the ETF.

Response: The ETF is technically capable of treating the ground water containing carbon tetrachloride and the treatment and disposal will be accomplished in accordance with all applicable laws and permit conditions as discussed in section X of this document.

Question. Operating history of the Pilot-Scale System has shown that there is a finite probability of bacterial growth in the treatment system. Backflushing has limited the negative effects in the current system, please provide information on how the ETF, using UV/Oxidation for removal of carbon tetrachloride, will prevent fouling of the UV lamps. Mat will be the cost associated with system revisions to overcome these lamps. That will be the cost associated with system revisions to overcome these difficulties?

Response: While bacterial growth has also been observed in the first year of ETF operation, it has not been associated with the UV/oxidation unit. The high intensity UV light along with the hydrogen peroxide have been shown to be very effective at controlling biological growth. Biological growth has been an operational problem with the ETF's filtration system. Currently the ETF's filtration systems are being modified to correct this operational problem.

Question. I have additional concerns about the potential problems associated with the mixing of waste streams in the LERF prior to the steams being treated in the ETF. After the streams are mixed, what element of the process has responsibility for the water? This appears to be analogous to the PRP questions facing landfills around the country today. Admittedly, the US Department of Energy is the ultimate responsible party, but contracting changes on the part of that agency are moving toward spreading the responsibility to individual contractors working for them.

Response: The DOE-RL is the owner of both the ETF and the LERF. Very recently, a contract for the Project Hanford Management Contractor (PHMC) has been awarded to Fluor Daniel Hanford, Inc (FDH). The PHMC has awarded a contract for the operation of the ETF and LERF to Rust Federal Services of Hanford Inc. (RFSH). The mixing or accumulation of wastes in LERF will continue to be in accordance with applicable permits, regulations, and requirements. The DOE-RL will continue to be the owner of the facilities, and manage the facilities and waste in a manner that is protective of the environment.

APPENDIX A

PUBLIC LETTERS

<IMG SRC 97048L>

The Nez Perce Tribe Department of Environmental Restoration and Waste Management (ERWM) has received and reviewed a copy of INTERIM REMEDIAL MEASURE PROPOSED PLAN FOR THE 200-UP-1 OPERABLE UNIT, HANFORD, WASHINGTON, DOE/RL-95-26 DRAFT A. Enclosed, for your consideration, are the ERWM's specific comments and suggestions on that document.

The Nez Perce Tribe recognizes the need to lessen uranium, technetium, and nitrate concentrations in the 200 Area groundwater. ERWM acknowledges the complexity of this remediation and fully supports this plan. However, we have some concerns that may affect the health and safety of members of our Tribe, the public, and the environment. Hereunder are our general comments:

a) The Nez Perce Tribe views this IRM proposed plan as only one pro-active step of many that are needed to prevent further degradation of the groundwater and eventually the Columbia River ecosystem by lessening the further spread of contaminants.

b) This plan does not include plans for cultural surveys prior to construction of the pump and treat facilities and groundwater wells or reference past cultural surveys. The Plan should be revised to include bringing in Tribal cultural experts to monitor construction activities.

c) Why is the carbon tetrachloride plume being ignored? The health risk of carbon tetrachloride is not considered. Eventually, the carbon tetrachloride pollution must be remediated. It is more economic and beneficial to the environment to treat all of the contaminants at once than to reinject carbon tetrachloride contaminated water and then treat it at a later date. The maximum carbon tetrachloride concentration in the groundwater is 320 ppb which is 64 times the drinking water MCL of 5 ppb for carbon tetrachloride. The goal of this IRM proposed plan should be to contain elevated concentrations of uranium, technetium-99, nitrate, and carbon tetrachloride to the 200 Area.

The Nez Perce ERWM Office appreciates the opportunity to provide comments on the INTERIM REMEDIAL MEASURE PROPOSED PLAN FOR THE 200-UP-1 OPERABLE UNIT, HANFORD, WASHINGTON, DOE/RL-95-26 DRAFT A. Specific comments are included on pages 3 through 6.

If you wish to discuss Nez Perce ERWM's comments further, then please contact Dr. Stanley M. Sobczyk. Dr. Rico O. Cruz, or Paul Danielson at 208-843-7375 or 208-843-7379 (fax).

<IMG SRC 97048M>

cc: John Wagoner, DOE-RL, Site Manager
Kevin Clarke, DOE-RL, Indian Programs Manager
Steven Wisness DOE-RL, Hanford Project Manager
Douglas Sherwood, EPA, Hanford Project Manager
J. Herman Reuben, Nez Perce ERWM, Cultural Specialist

RESPONSE TO

INTERIM REMEDIAL MEASURE
PROPOSED PLAN FOR THE 200-UP-1 OPERABLE UNIT,
HANFORD, WASHINGTON,
DOE/RL-95-26 DRAFT A

Comments Prepared By:

Nez Perce Tribe
Department of Environmental Restoration and Waste Management Staff

May 9, 1995

THE NEZ PERCE TRIBE
DEPARTMENT OF ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

COMMENTS ON THE
INTERIM REMEDIAL MEASURE PROPOSED PLAN
FOR THE 200-UP-1 OPERABLE UNIT
HANFORD, WASHINGTON
DOE/RL-95-26 DRAFT A.

Since 1855, reserved treaty rights of the Nez Perce Tribe in the Mid-Columbia have been recognized and affirmed through a series of federal and state actions. These actions protect the interests of the Nez Perce to exploit their usual and accustomed resources and resource areas in the Hanford Reach of the Columbia River and elsewhere. Accordingly, the Nez Perce Tribe Department of Environmental Restoration and Waste Management (ERWM) has support from the U.S. Department of Energy (DOE) to participate in and monitor certain DOE activities. The Nez Perce Tribe Department of Environmental Restoration and Waste Management Program responds to documents calling for public comment from the U.S. Department of Energy. The Program critically reviews and comments on papers in an objective and straight forward manner. Each document review is usually provided in a format that lists the Page number, Column number, Paragraph number, Sentence number: Comment. Following are specific comments on the INTERIM REMEDIAL MEASURE PROPOSED PLAN FOR THE 200-UP-1 OPERABLE UNIT, HANFORD, WASHINGTON, DOE/RL-95-26 DRAFT A.

SPECIFIC COMMENTS

Page 1, Column 1, Paragraph 1

The most important goal of this IRM should be to contain elevated concentrations of uranium, technetium-99, nitrate, and carbon tetrachloride to within the 200 Area.

Page 3, Figure 2

Figure 2 has an unacceptable lack of detail. All groundwater monitoring wells should be shown along with measurements of the contaminants. Additional figures should be shown to map each of the plumes individually. The carbon tetrachloride plume is not shown on Figure 2.

Page 5, Column 2, Paragraph 5

The maximum concentrations for each of the contaminants are not specifically shown on Figure 2.

Page 6, Column 1, Paragraph 2

This statement on risk evaluation is not detailed enough as the basic assumptions and pathways of exposure are not clearly explained. Studies supporting statements made are not referenced.

Page 6, Column 1, Paragraph 6, Last Sentence

If left unremediated, how long will it take for contaminants to migrate from the 200 Area to the Columbia River?

Page 7, Column 1, Paragraph 1

Is the implicit goal to reduce contaminant concentrations to less than 10 times the MCL?

Page 7, Column 2, Paragraph 1

Why are you not planning nitrate treatment during phase 1?

Page 8, Column 2, Paragraph 2, Last sentence

How does leaving long-lived radionuclides and other contaminants in the groundwater satisfy DOE Order 5820.2A (III)(2)(a)? This order states that no legacy requiring remedial action remains after operations have been terminated.

Page 8, Column 2, Paragraph 4

The Nez Perce Tribe believes RCRA regulations apply with regards, to the carbon tetrachloride waste water. In this document, a map of the carbon tetrachloride plume is not shown and there are no plans for treating the carbon tetrachloride. U.S. DOE-RL is trying avoid compliance with RCRA regulations.

Page 9, Column 1, Paragraph 1, Last Sentence

How does leaving long-lived radionuclides and other contaminants in the groundwater satisfy DOE Order 5820.2A (III)(2)(a)? This order states that no legacy requiring remedial action remains after operations have been terminated.

Page 9, Column 2, Last Paragraph, First Sentence

DOE-RL claims that the no action alternative has no added cost. DOE-RL continues to be oblivious of costs to the environment created by its lack of foresight.

Page 10, Table 2

The total estimated cost of the project should be shown. What percentage of the total cost is contractor overhead?

Page 10, Column 2, Last paragraph, Last Sentence

The Nez Perce Tribe concurs that the continued migration of these groundwater plumes presents a threat to public health, welfare, and the environment.

1168 Englewood Drive
Richland, WA 99352

August 8, 1995

Mr. Dib Goswami
Washington State Department of Ecology
Nuclear Waste Program
1315 W. 4th Avenue
Kennewick, WA 99336

COMMENTS ON THE PROPOSED PLAN TO TREAT GROUNDWATER FROM THE 200-UP-1 OPERABLE UNIT ON THE HANFORD SITE

Ref.: RL, 1995, Interim Remedial Measure Proposed Plan for the 200-UP-1 Operable Unit, Hanford, Washington, DOE/RL-95-26, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Dear Mr. Goswami:

I have reviewed the Proposed Plan to remediate the groundwater on the Hanford Site at the 200-UP-1 Operable Unit (Reference). The Proposed Plan identifies as the "preferred alternative" to upgrade the current pilot-scale system to pump and treat the groundwater. The only other alternative considered in the Proposed Plan is to take no action. Another alternative should be considered, namely to use the 200 Area Effluent Treatment Facility (ETF) to treat the groundwater. The groundwater could be pumped to the ETF via a pipeline installed earlier specifically for groundwater remediation. This pipeline is located in the same trench as the 200 Area Treated Effluent Disposal Facility (TEDF). The Liquid Effluent Retention Facility (LERF), could be used to temporarily store the groundwater.

The Proposed Plan was issued for public comment. Following are my comments:

1. Existing Facilities Are Not Being Utilized

   Confusion exists as to the origin of the equipment planned to be used to treat the groundwater in the preferred alternative. Some testing was previously done using pilot-scale equipment which operated at 25 gpm. The Proposed Plan indicates a full-scale system operating at 50 gpm will be used. Consideration is also being given to increasing the capacity to 120 gpm in the future. Ecology has said that this equipment was provided free-of-charge by the EPA. What equipment was originally provided and may be modified at what cost is not clear. Regardless, the ETF currently has available capacity to treat up to 150 gpm. This would allow the pilot-scale pump and treat equipment to be used elsewhere for groundwater remediation, and would avoid the cost of future upgrades.

2. Waste Minimization Is Not Being Provided

   Carbon tetrachloride is planned to be adsorbed onto granular activated carbon (GAC) in the preferred alternative. The spent carbon is a mixed waste that requires disposal unless it is regenerated. The volume of waste produced could be considerable if the capacity of the existing pump and treat equipment is increased. The preferred alternative will also use ion exchange to remove uranium and technetium. The spent ion exchange resin is similarly not planned to be regenerated and will produce additional waste. The ETF process includes an ultraviolet light/peroxide oxidation (UV/Ox) system whereby organic compounds are totally destroyed, producing little or no residue. Use of GAC was considered in the design of the ETF, but was eliminated because of the large volumes of waste that would be generated. Flexibility was retained to include GAC in the ETF process at a later date if needed. The ETF also has an ion exchange system capable of removing uranium and technetium, and the spent resin is regenerated so it can be reused.

3. The Groundwater Is Only Being Partially Treated

   No treatment is provided for nitrate in the preferred alternative. The treated water to be returned to the aquifer will greatly exceed drinking water standards. Granted, the nitrate contamination in the groundwater beneath the Hanford Site is widespread and would be difficult to remediate. However, that does not preclude responsibility for removing nitrate whenever possible to minimize the overall risk to the environment and the legacy we leave to future generations. The ETF process is highly effective at removing nitrate from groundwater.

4. The Preferred Alternative Will Cost Jobs

The ETF is a new $50 million facility intended to treat process condensate from the 242-A Evaporator and wastewater from the PUREX Plant. Startup of the ETF is planned for November. The first campaign will treat approximately 10 million gallons of process condensate now being stored in the LERF. When the next campaign occurs is anyone's guess. The 242-A Evaporator is used to concentrate the waste stored in the tank farms to make storage space available and reduce the need for new tanks. However, the need for tank space is now diminished and the PUREX Plant has also shut down. As a result, the availability of feed to the ETF is uncertain. Without feed the ETF will most likely be placed on standby. This will result in job losses that will ripple through the Tri-Cities economy. Even worse will be the perception on Capitol Hill of Hanford using hard-fought tax dollars to build facilities that have no apparent purpose. Using the ETF to treat groundwater would provide a stable, long-term mission.

5. Let The Stakeholders Make the Decision

Ecology has been advised several times in the past of the suitability of the ETF for treating groundwater. Yet the ETF was still not considered as an alternative. The Proposed Plan invites the public to participate in the selection process, but clearly the decision has already been made. Issuing the Proposed Plan for public comment without describing all the viable alternatives only gives the appearance of stakeholder involvement. The stakeholders cannot comment on something they know nothing about. An impartial panel of stakeholders should review the options and recommend a path forward. Persons knowledgeable about the capabilities of the ETF should be asked to provide technical input.

<IMG SRC 97048N>
<IMG SRC 97048O>
<IMG SRC 97048P>

Mr. Dib Goswami;
Washington State Department of Ecology
Nuclear Waste Program
1315 W 4th Ave
Kennewick, Wa. 99336

NMWMP - Hanford

August 15 1995

Kennewick

Subject; Comment on 200 Area Ground Water;

The principal source of hazards to humans from the carbontetrachloride class of solvents is due to inhalation of the vapors. Once solvent enters the blood stream it can attack the vulnerable organs of the body. In 1977, the American Chemical Society issued a warning on the hazards of exposures via the respiratory track could lead to cancer of the pancreas. Several deaths due to cancer of the pancreas did occur among the research chemists at Hanford, two of which were friends. If we pull these solvents out into the air and start processing, we increase by some increment, the chance of exposing the respiratory tract of the employees. My work with relative toxicity of material was in the 1970's for McDonnell Douglas, if my power of recall is accurate these solvents produce little if any hazard to the body due to ingestion. Since ingestion itself is remote why not leave the solvents where they are now?

The half lives of Uranium and Technetium-99 are so great that the number of disintegration per second are not significant. The toxicity of Uranium is related to its properties as a heavy metal and it's chemical toxicity is far more limiting than its radioactive properties. Since the average amount of Uranium present in the earth's crust is in the .03 ppm range, and natural deposits occur in nature, that are thousands of times the average concentration. If the concentration of uranium in the ground water is less than 1% of the deposits found in earth's crust. It should considered in the same category as natural occurring Uranium and no action should be considered. I submitted uranium ore samples to Battelle Northwest Laboratories for analysis, these samples were from a deposit under Midwest Lake in Canada. The analysis done by BNWL in the 1970's indicated the samples ran from 15 to 22 % uranium. These samples were uranium nickel arsenate, the arsenic had the dominate toxicity in the samples. This highly concentrated deposit was formed by a melting glacier. The mounds at Hanford were dropped by the receding glacier, who know, what is present hundreds of feet below the surface?

Prior to the start up of the Tritium Producing Reactors at Savannah River test were run to determine how far the discharge must travel to obtain full lateral dispersion of the tritium in the involved rivers. 1 It was shown that full lateral dispersion occurred within a few miles of travel. This means that complete dilution in the rivers would also occur within the few miles of the discharge point. The Columbia River has an average flow in excess of 180,000 cubic feet per second over and thru McNary Dam. This flow would provide dilution sufficient to dilute a 50 cubic feet per second of ground water flow by a factor of 3600. This indicates that the concentration in the ground water could be 3600 times the EPA drinking water standard and not exceed the EPA drinking water standard in the Columbia River.

The ground water access within the discharge triangle could be controlled by an organization such as the Port of Benton or the County of Benton. If the selected entity were provided a source of water for sanitary use and irrigation, it would eliminate the need for access to the ground water and increase the ground water dilution and flow.

1. AEC Handbook, "Source of Tritium", by D. G. Jacobs, 1968

<IMG SRC 97048Q>

<IMG SRC 97048R>

REQUEST FOR A PUBLIC MEETING ON THE INTERIM REMEDIAL MEASURE PROPOSED PLAN FOR THE 200-UP-1 OPERABLE UNIT AND COMMENTS ON THE PROPOSED PLAN

With this letter, I am requesting a Public Meeting be held on this IRM. I am hopeful that Ecology will listen to public opinion and take the necessary action to change the proposed plan and do what is right for Hanford, the taxpayers, and the environment--to utilize a state-of-the-art waste water treatment facility already available at Hanford to treat the ground water from 200-UP-1. A key concern, in addition to serious environmental issues, is fiscal accountability in these times of reduced funding.

The proposed plan endorses the $5M-10M dollar alternative to build a 50-120 gallon per minute treatment facility, when an under utilized 150 gallon per minute facility already exists at Hanford--the new 200 Area Effluent Treatment Facility. If the IRM is necessary to prevent further movement of the nitrate, uranium, and technetium-99, the 200 Area Effluent Treatment Facility is the best option available!

The 200 Area Effluent Treatment Facility will provide:

1) Greater reduction of the contaminants. The 200-UP-1 plan proposes to proceed with the favored alternative even though not all of the site's contamination problems will be addressed. But the 200 Area Effluent Treatment Facility can far exceed the contaminant reduction proposed. Will Ecology continue to support the proposed inferior treatment, knowing that a superior treatment is available at Hanford?

In addition, an uninterrupted flow of clean water for injection purposes could be made available from U-Plant--so why would Ecology and EPA endorse reinjecting contaminated water?

2) Treatment for 150 gallons per minute. If there is truly an environmental urgency requiring the IRM, please consider using the 200 Area Effluent Treatment Facility that can provide treatment quickly-- verses the eventual scale up to 120 gallons per minute your plan proposes. In light of your established need for an IRM, will Ecology support a more aggressive remedial action utilizing the available 150 gallon per minute process?

3) Great improvement to waste minimization. The capability alone to regenerate the ion exchange beds can greatly reduce resin costs and secondary waste volumes. Similarly, UV/Oxidation destroys VOCs rather than creating additional carbon waste. Does Ecology support the production of unnecessary secondary waste when a treatment process is available that will provide for waste minimization?

An additional point not considered in the proposed plan was the fact that the Environmental Restoration Program has already installed (and paid for) a pipeline to carry the 200-UP-1 ground water to the 200 Area Effluent Treatment Facility. The infrastructure is available, is Ecology willing to change the proposed plan and endorse utilizing that infrastructure?

I am confident that Ecology can revisit the alternatives and see how using the 200 Area Effluent Treatment Facility is a far superior plan. I am requesting that you take this opportunity to make a change--think out of the box--and do what is right for Hanford.

<IMG SRC 97048S>

NMWMP - Hanford

AUG 21 1995

Kennewick

August 17, 1995

Dib Goswami
Dept. of Ecology
Nuclear Waste Program
1315 W. 4th Ave.
Kennewick, Wa. 99336

Dear Mr. Goswami,

Though I live " down wind" from Hanford, I'm concerned about the long-range effects Hanford could cause. We are still in the early stages of Hanford's birth. Though there are qualified people working their constantly learning and developing new ways to improve storage, I don't believe there is yet a sure fire system to completely protect the waste from contaminating the land and people. The last couple of weeks I had the opportunity to fly over the facility. I was shocked to see it situated so close to the Columbia River. My immediate reaction was "how stupid to build such a potentially deadly facility so close to a major waterway. Yes, I have heard stories about the issues, but now visually seeing it brings it closer to home. As delicate as Nuclear energy is and how government runs it is very important to our planet. Every particle of being on the planet including the planet itself is a living organism. We don't have all the answers on how to protect us. We haven't developed a perfect means of getting results of damages to the planet. The planet itself is being affected by our experiments and needs. What guarantees are there that cleaning the ground water with another caustic material and returning it to the soil will not create another poisonous problem to the planet.

I'm sure my concerns aren't as vocal as those that live next to the facility. The balance of our earth depends on all organism to fulfill their natural cycle of existence. We have created an imbalance in so many areas that the planet is struggling to survive.

Please respect the earth, look to the future of the planet. Create a balance between all organisms so that we don't destroy ourselves even more.

I live and breath each day not knowing how pollutants are affecting me. I do know that the chemicals I've been around have caused damage to my health and well-being. The nations lives depend on your research and support.

Your proposal stated is one alternative, what other alternatives do you have? I assume there is no way to neutralize it. It seems that radioactive material in its own form has natural substances that it works with that maybe could be tapped and used to defuse the waste.

Sincerely,
Vicky Lyons

Aug. 23, 1995

251 Green Meadows
Yakima, WA 98908
(509) 966-9399
August 21, 1995

Mr. Dib Goswami
Washington State Department of Ecology
Nuclear Waste Program
1315 W. 4th Avenue
Kennewick, Wa 99336

COMMENTS ON THE PROPOSED PLAN TO TREAT GROUNDWATER FROM THE 200-UP-1 OPERABLE UNIT ON THE HANFORD SITE

Ref: RL, 1995, Interim Remedial Measure Proposed Plan for the 200-UP-1 Operable Unit, Hanford, Washington, DOE/RL-95-26, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Dear Mr. Goswami:

The proposed plan recommends a groundwater pump and treat action to halt the spread of the highly contaminated portion of the 200-UP-1 plume. I agree with this recommendation and support its implementation.

However, I recommend that Ecology consider the 200 Area Effluent Treatment Facility (ETF) rather than the continued use of the pilot-scale equipment for the implementation of the preferred alternative. The ETF has several potential advantages over the continued use and/or upgrade of the existing pilot-scale treatment equipment. These advantages include:

- Treatment Capability - The ETF is a state-of-the-art treatment facility that will provide treatment for contaminants expected in the 200-UP-1 Plume (i.e. nitrates, technetium-99, uranium and carbon tetrachloride).

- Waste Minimization - The ETF design includes several steps to reduce the amount of secondary waste produced. The ETF ion-exchange resins are regenerated, while in the pilot-scale unit they are buried. In the ETF organics are destroyed, whereas, in the pilot-scale unit, they are adsorbed on activated carbon and then buried.

- Utilization of existing facilities - The ETF has available capacity and staff to treat 200-UP-1 groundwater. There is an existing line to transfer the groundwater from 200 West to 200 East. The Liquid Effluent Retention Facility is available to hold the groundwater prior to treatment in the ETF.

- Alternative application of pilot-scale equipment - The pilot-scale equipment could be relocated to other locations to collect engineering data on other plumes, or to allow the remediation of sites which are not viable candidates for treatment in the ETF.

Again, I urge Ecology to consider the use of the ETF in the implementation of the preferred alternative. I believe this evaluation will reveal the ETF is a cost effective alternative to the one proposed in the Interim Remedial Measure. Additionally, utilization of the ETF could serve as an example of how two DOE sub-contractors can work together to clean up the Hanford Site in a cost-effective manner.

<IMG SRC 97048T>

<IMG SRC 97048U>

COMMENTS ON THE PROPOSED PLAN TO TREAT GROUNDWATER FROM THE 200-UP-1 OPERABLE UNIT ON THE HANFORD SITE

Ref: RL, 1994, Hanford Sitewide Groundwater Remediation Strategy, DOE/RL-94-95, Rev. 0, U.S. Department of Energy, Richland operation Office, Richland, Washington.

RL, 1995, Interim Remedial Measure Proposed Plan for the 200-UP-1 Operable Unit, Hanford, Washington, DOE/RL-95-26, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Dear Mr. Goswami:

The proposed plan recommends a groundwater pump and treat action to halt the spread of the highly contaminated portion of the 200-UP-1 plume. I agree with this recommendation and support its implementation.

I believe that the recommended alternative of upgrading the current pilot-scale equipment has several disadvantages that must be addressed before proceeding:

Waste Minimization - The pilot-scale unit will adsorb carbon tetrachloride into activated carbon. When spent, the activated carbon becomes a mixed waste that requires disposal. This is not following good waste minimization practices. One method that should be considered to destroy carbon tetrachloride and minimize waste is the process of organic destruction by ultraviolet light/peroxide oxidation (UV/Ox).

In addition, the pilot-scale unit uses ion exchange to remove uranium and technetium. The spent ion exchange resin is not planned to be regenerated and will produce additional waste. Ion exchange units that can be regenerated to minimize waste should be considered.

Partial Treatment - The pilot-scale unit does not have the capability to treat the nitrate concentration down to below drinking water standards. This is not acceptable when processes and facilities exist to remove nitrate contamination.

Utilization of Existing Facilities - The 200 Area Effluent Treatment Facility (ETF) is a new $50 million facility built to treat process condensate from the 242-A Evaporator. This facilities feed source has significantly diminished due to PUREX not being in continued operation.

The Hanford Sitewide Groundwater Remediation Strategy (RL 1994) states that "use of available resources such as the ETF will be considered in planning for groundwater remediation". This facility must be considered in the remediation of groundwater at the 200-UP-1 Operable Unit.

The ETF facility mentioned above was designed to treat contaminants expected in the 200-UP-1 Plume (i.e. nitrates, technetium-99, uranium and carbon tetrachloride) and has several advantages that the current pilot-scale equipment does not:

Waste Minimization - The ETF uses the UV/Ox process described above to destroy organic material and its ion exchange process includes a regeneration cycle which follows waste minimization policies. In addition, any secondary waste that is produced is dried to a powder to further reduce waste generation.

Partial Treatment - The ETF has the ability to lower nitrates below the drinking water standards. In addition, organics and radionuclides are reduced to minimum levels.

Utilization of Existing Facilities - The ETF has available capacity and staff to treat the 200-UP-1 groundwater. This can be accomplished via an existing transfer line located between the 200 West, and 200 East Area in the same trench as the 200 Area Treated Effluent Disposal Facility line (200 Area TEDF). Also, the Liquid Effluent Retention Facility (LERF) is available to hold the groundwater prior to treatment at the ETF.

This is not to say that the pilot-scale facility cannot be further utilized. It can be relocated to collect engineering data and perform small scale treatment on other plumes.

In summary, due to disadvantages in the current pilot-scale equipment, Ecology must consider the use of the 200 Area Effluent Treatment Facility in the implementation of the preferred alternative to remediate the groundwater at the 200-UP-1 Operable Unit. I believe this evaluation will reveal the ETF is a cost effective alternative to the one proposed in the Interim Remedial Measure. Additionally, utilization of the ETF could serve as a public example of how DOE, WDOE, and two Hanford sub-contractors can work together to clean up the

Hanford Site in a cost-effective manner.

I look forward to hearing your response on this matter and am available if you require clarification or any points or would like additional information.

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<IMG SRC 97048W>

The 200 Area Effluent Treatment Facility (ETF) has the State-Of-The-Art treatment capability and capacity necessary to handle the planned groundwater treatment effort. While it's always nice to give design and construction engineers another opportunity to practice there trade, building additional treatment capacity to handle the 200-UP-1 plume while the ETF goes into mothballs does not speak of a wise expenditure of tax dollars. It is important to remember that the Effluent Treatment Facility was originally built with the concept of treating flows from other sources. Toward this end a contingency pipeline was constructed that can be used to transport groundwater to the Liquid Effluent Retention Facility (LERF) where it can be stored prior to treatment at the ETF.

Beyond the existing infrastructure, the ETF facility will be able to treat groundwater to high discharge standards, holds the necessary discharge permitting and will produce less secondary waste as a byproduct of treatment. Both from the standpoint of cost and treatment capability, it is difficult for me to envision how the construction of additional capacity for a pilot plant would help further the environmental mission at Hanford.

Should the option of expanding the capacity of the pilot scale facility continue to receive WDOE endorsement, I would ask that a full and complete cost benefit analysis be performed comparing upgrading the pilot facility to the use of the EFT. At a minimum I believe factors such as the capital, O&M, achievable treatment standards, production of secondary waste and facility permitting be evaluated in comparing upgrading the pilot scale equipment against the use of the ETF. Also, I would expect that this cost benefit evaluation be conducted with public input into the process.

As a final point, I would ask to be notified of any Water Board actions related to this matter. I would like to discuss this issue with board members should it be placed on their agenda.

<IMG SRC 97048X>

12215 - 9th N.W.
Seattle, WA 98275
September 6, 1995

Dib Goswami
Washington Department of Ecology
Nuclear Waste Program
1315 West 4th Ave.
Kennewick, WA 99336

Dear Ms. or Mr. Goswami:

I am writing to offer some comments concerning the Interim Remedial Measure Proposed Plan for the 200-UP-1 Operable Unit, Hanford, Washington. I will add that I do not know a lot about Hanford, but I fear that the public pressures for action are probably not founded on a good understanding of risks. I ask that as studies at this Operable Unit, and other units as well, progress, that considerations of several variations of the "Do Nothing" alternative be more thoroughly and objectively evaluated. The "do-nothing" alternative can include deed restrictions to keep people out of harm's way (and preserve open space) and monitoring. Better understanding the possible safety of a "do-nothing" alternative is sorely needed. Indeed, this is crucial so if cleanup actions are actually taken, we can understand what benefit has resulted. From my reading of the Interim Remedial Measure, I see nothing that supports the position that the "do-nothing" alternative is not the best alternative. Rather, it is just glossed over as unacceptable and unprotective.

The Summary of Site Risks indicates that uranium and technetium-99 present a relatively high potential risk for their carcinogenic characteristics. A level higher than 10 -5 was stated. However, this was called a "potential" risk because it required a population to actually be exposed to these contaminants by drinking well water from the plume, and this consumption rate would persist for their life times, solely from the plume. A hazard index of 4 was also computed for a potential noncarcinogenic risk associated with uranium and nitrate. Each of these potential risks were based on the assumption that "the land in this downgradient area were used for residences and humans were to drink the groundwater" (pg 6). I don't believe that the land is actually used for residences and the drinking of groundwater. I don't believe there is actually an exposed population. Therefore, I don't believe that the risk characterization is portrayed correctly. I do believe that the opportunity for deed restrictions to keep people from drinking groundwater from the site can insure that risks will be avoided in the future. I believe the following questions need to be honestly answered before we expend large amounts of money cleaning things up.

1. Is there really any exposed population in the path of this plume now?

2. Since the source has been halted, what changes over time might be expected to the constituents of this plume? What is the half life for technetium-99? How fast does the plume move? What dilutions are expected?

3. Is there any logical basis to assume that future site uses will be thrown open to the public to flock to home sites and to drink well water from Hanford? My thoughts are that no matter how good a cleanup is ever achieved, the public really isn't going to be willing to do this anyway.

4. Is the land on the Hanford Reservation currently under government ownership?

5. Couldn't the land downgradient of any plumes or potential plumes from Hanford remain in government ownership in order to restrict uses (such as drilling drinking wells) that could result in exposures? Wouldn't this in fact also preserve it as wild open space, which is an ecologically desirable objective?)

6. If the objective of the cleanup is for the government to later sell the land for future residential development, does the cost for this development opportunity make any economic sense at all when compared to the cost of keeping the area undeveloped?

A risk-risk analysis is needed. This analysis needs to examine the human health risks associated with the costs of cleanup. Costs (any costs) also carry risks. They are currently paid by present and future taxpayers. They are paid with deficit dollars, meaning interest costs mount up as well. These expenditures come at the cost of preventing use of the same money for other needs, such as education, welfare, school loans, housing, etc. These expenditures make taxpayers incrementally poorer, which in turn can equate to direct health and welfare impacts on the population at large. These risks are very real, and may be roughly quantified. These risks are more real than the risks described in the Interim Remedial Measure document because there is a population that will realize these costs, whereas the risks that this action is seeking to reduce is hypothetical, based on some future population living there and drinking the groundwater. The actual risks at present are essentially non-existent, since there is no exposed population.

The Interim Remedial Measure document shows that evaluation criteria includes the following threshold criteria:

"Overall Protection of Human Health and the Environment"

The document flippantly writes off the "no-action alternative" stating that it "does not change the overall protection of human health and the environment" while alternative 2 "would serve to contain the high-concentration area of the plume and remove contaminant mass from the aquifer" therefore reducing risks and improving overall protection of human health and the environment.

As part of objectively evaluating the do nothing alternative, consider the following questions:

1. Assuming that nobody moves into the area over where the plume is and where the plume may migrate to, and specifically, nobody drills wells and drinks most all of their water from those plumes for their life times, then how does alternative 2 reduce risks and improve the overall protection of human health and the environment? Exposure was zero, and remains zero.

2. Assuming alternative 2 carries costs in the millions, and that further studies also carry costs, and further remedial actions may also be proposed later with even more costs, and that because of the deficit nature of federal spending, those costs will also carry substantial financing costs, what impact on human health is expected associated with those costs? There is an impact. This impact is not zero.

There are other evaluating criteria based on long-term effectiveness and short-term effectiveness. If the no-action alternative also considers restrictions on humans ever using the downgradient area for drinking water wells, wouldn't that restriction result in a high short and long-term effectiveness?

<IMG SRC 97048Y>

MEMO

To Dib Goswami, WaDOE

From Lincoln Loehr

Date 9-9-95

Subject correction to comments

On September 6, 1995 I mailed comments to you that had the wrong return address. I recently moved, and made the mistake of putting my old street address in Seattle along with my new zip code from Mukilteo. Please note that my correct address is:

Lincoln Loehr
11500 West Oakmont Drive
Mukilteo, WA 98275-4871

For simplicity, I have attached a corrected set of my comments. The only change is the return address. I am also on a mailing list to receive information from Ecology on cleanup matters at Hanford. Could you please pass this memo on to whoever maintains the mailing list so my address can be corrected?

Thanks for your assistance.

September 27, 1995

NMWMP - Hanford

OCT -4 1995

Kennewick

Dib Goswami
Washington Dept. of Ecology
Nuclear Waste Programs Office
1315 West 4th Ave.
Kennewick, WA 99356

Dear Mr. Goswami:

I attended last evenings public comment meeting on the Interim Remedial Measure Proposed Plan for the 200-UP-1 Operable Unit. I found the comments and questions offered by the audience to be informative, and at the same time troublesome. To address the portions of the comments that were troublesome, I present the following questions:

1. If the Effluent Treatment Facility (ETF) has the capacity to handle 180 gallons per minute of waste water, and the UP-1 were to provide a base load of 50 gallons per minute, would the effective cost of treatment equal 50/180 of the operating cost of the ETF?

   As noted at the meeting, ETF is a $50M facility, with a current budget of $18M per year. It would seem that the 200-UP-1 share of that operating cost would be about $5M per year, a factor of 3 greater than that presented in the proposed plant.

2. Proposers of using the Pilot-Scale Treatment plant offered information on the treatment efficiency of their operation. As Ms. Wanek stated the target operating efficiency for FY-1996 is 80%. Before any move is made to make ETF the sole or partial treater of the water, please provide similar operating data for that facility.

3. Proponents of the ETF made numerous mention of the facility being double contained, is the pipeline from 200 West Area to the ETF also double contained?

4. Please address the issue of listed waste, and how disposal of water which has been in contact with the listed material (carbon tetrachloride) can be accomplished through the ETF.

5. Operating history of the Pilot-Scale System has shown that there is a finite probability of bacterial growth in the treatment system. Backflushing has limited the negative effects in the current system, please provide information on how the ETF, using UV/Oxidation for removal of carbon tetrachloride, will prevent fouling of the UV lamps. What will be the costs associated with system revisions to overcome these difficulties?

6. I have additional concerns about the potential problems associated with the mixing of waste streams in the Liquid Effluent Retention Facility (LERF) prior to the streams being treated in the ETF. After the streams are mixed, what element of the process has responsibility for the water? This appears to be analogous to the PRP questions facing landfills around the country today. Admittedly, the US Dept of Energy is the ultimate responsible party, but contracting changes on the part of that agency are moving toward spreading the responsibility to individual contractors working for them.

Thank you for considering these comments.

David A. Myers
2533 Davison
Richland, WA 99352

<IMG SRC 97048Z>

Re: 200-UP-1

Dear Dr. Goswami:

Two issues must be resolved before a proper record of decision can be made regarding the cleanup of 200-UP-1. The first issue is multi-faceted, dealing with satisfying established stakeholder values, especially protecting the Columbia River, protecting workers' safety and health, and reducing costs.

You claimed that you are not concerned with cleaning up the nitrate contamination, which appears to directly violate the stakeholders' value of protecting the Columbia River. On the other hand, you insist on cleaning up the technetium and uranium, which Donna Wanek claimed could be performed with 100% efficiency. You seem to have unilaterally decided that protecting the Columbia River means to not allow select contaminants to reach the river at concentrations greater than the MCLs. I saw no evidence that this cleanup effort will accomplish that goal. The only modeling results presented dealt with groundwater flow and capture zone analyses in the area immediately surrounding the proposed injection and extraction wells. If the cleanup effort will not reduce the concentrations below the MCLs, then why bother?

Under all alternatives, the portion of the Columbia River that would exceed MCLs (or some other appropriate criteria) should be determined - is it 10 square feet or 10 square miles. Values do not require that they be completely satisfied regardless of the cost (as you have already declared by not cleaning up the nitrate plume), so it is highly desirable to see the resulting damage done within the river that is predicted for each alternative.

I would question the validity of the modeling results, because Bechtel's geohydrologist stated that it is beyond the state-of-the-art of modeling to demonstrate "short-circuiting." All that a model has to contain are two highly contrasting layers in terms of horizontal hydraulic conductivities to achieve this effect. This leads me to wonder if all Bechtel modeling is accomplished using only one soil type, even though we know that the Hanford and Ringold soils are highly heterogeneous.

I have concerns about the capabilities of this cleanup approach to contain the plume and thus ultimately protect the Columbia River. Assume that the natural groundwater flow is say 20 gpm through the capture zone before dumping. If pumping is started at 20 gpm, then all the water will be captured. If all the extracted water is injected upstream, i.e. at 20 gpm, and the system is allowed to reach steady state conditions, then the combined flow rate must be sgpm (or undesirable plume spreading occurs that pushes contaminants beyond the original capture zone lateral boundaries). With water moving at 40 gpm and pumps operating at 20 gpm, then water must escape the system at a rate of 20 ppm. If the extraction rate is equal to the injection rate and steady state conditions are achieved, then water must escape the system at the rate at which the water moved before pumping commenced. In reality, transient conditions will occur, however, I saw no indication at the public meeting that transient conditions were modeled, nor that the results presented were for a specific time after the start of operations.

The second stakeholder value that was not addressed was the workers' safety and health. Conducting these operations imposes risks to workers from both radiological and construction/operation viewpoints and from travel to and from the site. Those risks must be weighed against the reduction in risk to the public from conducting these cleanup efforts. Without having analyses in hand that clearly demonstrate that the benefits outweigh the increased worker risks, you do not have a proper basis for issuing a ROD.

The third stakeholder value that is not properly considered is reducing costs. Disposal costs obviously have not been considered, because Bechtel could not answer the question of how disposal would be accomplished. Consideration of all costs involved with building, operating, and decommissioning a new facility versus using the ETF must be considered. You should get estimates with backup calculations from both Bechtel and WHC to perform a bounding analysis. If Bechtel has no plans to use the pipeline that was built for their benefit, then why were taxpayers' dollars spent building the pipeline and how does that satisfy the stakeholder value of reducing costs?

You should express the benefit of accomplishing this cleanup as dollars per death saved where the death saved is the reduction in public deaths less the increase in workers' deaths. This approach will provide a means for prioritizing cleanup activities across the site. Prioritization will become extremely important as budgets are further reduced.

The second issue deals with the absence of vital information for the public meeting. Costs for the ETF alternative were not available for the public meeting, so you did not receive all the public input required to reach your decision. Modeling results were woefully inadequate to make any determination about the validity of claims by Bechtel on cleanup durations. Absolutely nothing was provided about modeling assumptions, so the public is not able to perform a reality check on the modeling.

I saw no modeling results involving contaminant transport. Reinjection should show diminishing returns if properly modeled. When the heterogeneous nature of the aquifer is properly considered, the pump-and-treat should indicate that the highly conductive zones will be cleaned first. After that cleanup is accomplished, further reinjection will likely result in only cleaning reinjected water. After turning off the pumps, contaminants from within the less conductive zone will redistribute to the more conductive zones and the concentrations at the extraction well and monitoring wells will increase. None of these effects is captured with a flow model, nor were any results of this nature presented at the public meeting.

In conclusion, I do not believe that you are in position to render a defensible decision yet. You have not adequately addressed stakeholder values for have you presented sufficient information for the public to fully comment on these cleanup activities. I recommend that you resolve these issues, then hold another public meeting.

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<IMG SRC 97048Z2>